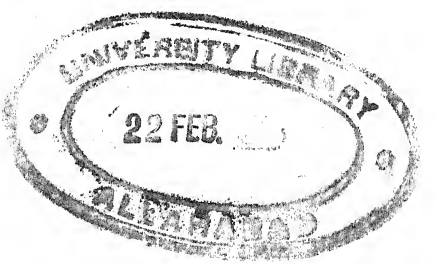
NUTRITION AND RELIEF WORK

A Handbook for the guidance of Relief Workers



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FOREWORD

AT the invitation of the Council of British Societies for Relief Abroad, Sir Jack Drummond, Scientific Adviser to the Ministry of Food, Dr. Audrey Russell Ellis, Medical Director of the International Commission for War Refugees, Miss K. Marriott, Principal Assistant Organizer, Children's Care Work, London County Council, and Mr. Michael Hacking, Quartermaster of the Friends' Ambulance Unit, very kindly consented to serve as a Committee for the purpose of compiling an up-to-date manual on nutrition in its relation to relief work.

The Committee received valuable assistance from many quarters, in particular from Dr. E. R. Bransby, Mr. F. Le Gros Clark, Dr. Melville Mackenzie, Mr. Louis Moss, Dr. J. Pace, Dr. M. Pyke, Dr. H. M. Sinclair, Dr. Hugh Stannus, and Dr. P. Lamartine Yates. Chapter V is based in part on data kindly supplied by the staffs of Allied Governments.

The Council is deeply indebted to the members of the Committee and to the other experts for enabling it to produce a publication which should be of practical use to relief workers in the field as well as to those concerned with relief administration.

WILLIAM GOODE,
Chairman,
Council of British Societies for Relief Abroad.

October 5th, 1944.

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INTRODUCTION

THE carrying of relief, whether as personal service or in material form, to the newly liberated areas of Europe is a venture on which governments, armies, and an international agency—U.N.R.R.A.—are engaged, and in which many voluntary societies are also preparing to take part. Though before the war Europe was largely self-supporting in food, war has caused shortages of food over most of occupied Europe, varying in degree from famine in Greece to comparative adequacy of diet in Denmark. It is inevitable that the immediate effect of military operations should be inimical to civilian welfare; and thus it is likely that measures of relief will be required even in areas where comparatively good conditions prevailed before liberation.

An essential for any rational scheme of relief is that it should be based on a sound investigation into the needs for it. Some needs, those for instance of industry and of medicine, are so technical that their evaluation must of necessity be reserved for experts. But other needs can well be the subject of enquiry by those who would probably be most happily described as intelligent amateurs. This book has been produced primarily with those people in mind, and the centre round which the book has been written is the investigation of the need for food. Thus the first three chapters describe, as shortly as possible and with the familiar defects of brevity, something of the theory of food, why it is necessary, what it does and what the effects are of various shortages. In order to obtain an idea of what conditions were before the war, so far as food habits were concerned, many investigations and interviews were made and the fifth chapter is the result. It had been hoped to include tables of the heights and weights of children in various countries before the war also as a basis for comparisons. So far as we have been able to discover, however, there is insufficient information to be useful. The average height of schoolchildren of 14 in Norway increased by 7 centimetres

between 1920 and 1935; and if, as is possible, similar increases have occurred elsewhere, it is clearly of little value to have figures more than ten years old. It seems generally agreed that there are considerable variations in the average stature of children as between different countries and regions; and yet for hardly any continental country are there recent figures; we understand that the position in the United Kingdom as a whole is little better.

But though the investigation of the need for food is the centre of this book, it must not be supposed that the primary importance of food has blinded us to other needs. Indeed food is no use without fuel and utensils; many people in the past have not received the food they needed because they lacked clothes or footgear, others through disease have not profited from feeding, and the effect of low real income (either through endemic poverty or through sudden inflation) in a situation of scarcity is commonplace. An investigation into the need for food will often bring to light other needs and their interrelationship; it would be an intolerable burden, equally on the relief administration and on the needy people, for different needs to be investigated separately, and it will be clear from the fourth chapter that, by and large, the same methods apply to each investigation and that many problems can be investigated together.

CHAPTER 1

THE ELEMENTS OF NUTRITION

MANY different kinds of diets are eaten in the different countries of Europe, and by the different races of the globe; and without scrutiny it is impossible to say that one kind of diet is necessarily better or worse than another. For proper nutrition the daily diet must contain an appropriate amount of each of a number of nutrients. Most foods contain several nutrients so that the total amount of each can be made up in very many ways by various combinations of one or other of many foods. It follows that if a particular group of people is malnourished, there is not necessarily any need to impose on them an alien pattern of diet in order to give them adequate nutrition. Most national diets, if not nutritionally adequate, can usually be made so by suitable modification, without any drastic alterations in their general pattern. This is an important principle to bear in mind, because efforts to improve nutritional standards by methods which run counter to long established traditions and usages will be very difficult to apply in practice.

Before proceeding to discuss nutrition in detail, it is perhaps appropriate to set out two definitions. Firstly, we may define food as anything, either solid or liquid, which when it is swallowed and assimilated can do one or more of three things: (*a*) enable the body to maintain its normal temperature or perform physical work; (*b*) provide material to enable growth, repair or reproduction to proceed; (*c*) supply substances which normally regulate both the production of energy and the processes of growth, repair and reproduction.

The constituents of foods that perform these functions are known as NUTRIENTS. The nutrients are classified as follows:

Carbohydrates, Fats and Proteins provide the body with

energy. If eaten in excess of the daily needs the surplus will be laid down as fat.

Proteins and certain mineral substances provide material for growth and repair of the body, and for the regulation of the processes of life.

Vitamins and other *accessory* substances regulate the body's chemical processes. Some of the vitamins are closely related to the utilization by the body of energy foods, particularly carbohydrates.

Water and the oxygen provided by *air* are necessary for the maintenance of life.

A Brief Description of the Common Nutrients

1. Carbohydrates

(*a*) Sugars

(i) *Glucose.* Occurs in fruit and in honey. Other digestible carbohydrates are converted into glucose in the body. The sugar in the blood is glucose and it forms the primary nutrient of all the organs of the body. Less sweet than cane sugar. It is a fallacy that glucose is the most readily assimilable source of carbohydrate energy. Ordinary sugar and starch are equally effective.

(ii) *Cane or Beet Sugar.* These are identical and are known to the chemist as *sucrose.* Sucrose is converted into glucose during absorption from the digestive tract.

(iii) *Milk Sugar* is *lactose.* It is less sweet than cane sugar but chemically similar. It is converted to glucose in the body.

(*b*) Starch

By far the largest proportion of carbohydrate in human foods occurs as starch. Chemically it is composed of many glucose molecules bound together. It is digested in the body to yield glucose and is absorbed in that form.

(*c*) CELLULOSE

This is another form of a complex molecule built up of glucose units but it differs from starch in being resistant to digestion in the human tract. Ruminant animals can digest it. Cellulose forms a large part of the structural part of plants. Broadly speaking, the more fibrous a plant food is, the more cellulose it contains. Not only is cellulose not digested in the human system, it may prevent other constituents of the food from being fully digested. Raw potato or raw carrot are poorly digested by comparison with the cooked products because the unbroken cellulose membranes prevent access of digestive juices to the nutrients enclosed. The membranes are ruptured on cooking.

All digestible carbohydrates have an average calorie value of 4 calories per gram.

2. Fats

This group of nutrients includes all edible oils and fats, such as suet, lard, butter, margarine, vegetable oils, but it does not include the mineral oils. The latter have no food value whatever. All common edible oils and fats are well digested (95 to 98 per cent.) by the normal individual. *All digestible fats have an average calorie value of 9 calories per gram.*

Fats and fatty meals tend to stay longer in the stomach than meals that are predominantly starchy. For this reason fats have " satiety " value.

3. Proteins

These are complex nitrogen-containing compounds which form part of the structure of all living cells. The compositions of the proteins of foods show wide differences. These differences are nutritionally important. During digestion, proteins are broken down into a variety of units known to the chemist as *amino-acids*. They are the " building stones "

which are used in the body to construct new protein for growth or for repair. This utilization is obviously most economically achieved if the composition of the proteins in the food is similar to that of the proteins to be formed in the body. This is so in the case of the proteins of *meats, fish, eggs and milk*. The proteins of these foods are, therefore, differentiated as "*animal*" or "*first-class*" *protein*, because they are the most efficient providers of the selection of amino-acid units required by the growing or recuperating body for building new tissues.

The proteins of *cereals* are less efficient in this respect. A larger quantity of wheat or rye proteins is required to provide the "building stones" for growth and repair than is the case when meat, fish or dairy produce is available. The proteins of *pulses* are intermediate in growth value between the proteins of cereals and those of animal foods.

The proteins of *green vegetables* are nearly as good as those of meat, milk and eggs, but the quantity of proteins in green vegetables is relatively very small. The proteins of *potatoes* are intermediate in food value between those of cereals and green vegetables.

Mixtures of food proteins often have a higher growth value than that of the component proteins. This so-called "*supplementary action*" *of proteins* is of very great nutritional importance. Thus, for example, a mixture of 80 per cent. wheat and 20 per cent. soya beans gives a protein blend having a nutritional value nearly as high as that of meat or milk. Similarly, a mixed vegetarian diet, providing proteins from cereals, pulses, potatoes and green vegetables, can provide an excellent protein blend for growth and repair.

4. Mineral Substances

The body contains 19 or more major mineral substances, all of which must be derived from food. These substances are needed for three main purposes: (*a*) as constituents of bones and teeth, (*b*) as constituents of blood corpuscles and other cells of the body, (*c*) as soluble salts to maintain the composition of the body fluids.

(*a*) *Calcium* and *phosphorus* are important in that they provide the chief building material for development of teeth and bones. After the period of growth good supplies of calcium and phosphorus are required to maintain the bones and teeth in a healthy condition. A deficiency of calcium in adults may lead to withdrawal from the bone, with consequent weakening of the limbs. *Vitamin D* assists the assimilation of calcium and phosphorus, particularly when the amounts of those elements in the diet are smaller than is desirable.

(*b*) *Iron* is an essential constituent of the pigment (haemoglobin) of the red cells of the blood. Interference with the formation of haemoglobin will occur when diets are deficient in iron. The resulting condition is known as *nutritional anaemia*.

(*c*) *Iodine* is required for the proper functioning of the thyroid gland. In regions where the food or drinking water is deficient in iodine, a form of goitre, which is a disorder of this gland, is common. The incidence of this condition can be reduced by adding potassium iodide to the diet; usually it is added to table salt.

(*d*) *Salt* (sodium chloride) is an essential nutrient. It forms an important component of the body fluids (blood, lymph). Heavy sweating causes a loss of salt from the body. If it is not replaced the amount of salt in the blood may be reduced below the normal level. This condition gives rise to severe muscular cramps. The condition was common among miners working in deep, hot mines, who sweated copiously and drank large amounts of water. It was found that the loss of salt from the body could be compensated by drinking water containing a percentage of ordinary salt. This drink is relished under these conditions and is now habitually used in deep mines. Cases of miners' " cramps " are not often encountered to-day.

5. Vitamins

The vitamins are a heterogeneous group of nutrients, each essential for the life and well-being of the body. They are

differentiated from the major nutrient groups (fats, carbohydrates and proteins) because relatively very small amounts are needed. Thus, whereas the fully grown man needs about 70 g. of protein daily, his requirement for vitamin B_1, known also as aneurin or as thiamin in U.S.A., is about 1·5 mg., i.e. about 1 to 50,000 parts of protein.

Vitamin A is a substance which occurs in association with the fatty part of foods. In the body it serves several functions. It is necessary for the growth of children, it plays a part in maintaining the mechanism by which the eyes perceive light, and in maintaining the health of the skin and similar structures, including the front of the eyes (cornea). A definite amount of vitamin A is necessary for health, and if this amount is not obtained trouble will arise. If more is consumed than is needed there will be no direct benefit, but much of the excess will be stored in the liver, so that if a large amount is eaten at one time deficiency will not arise until a considerable period has elapsed, even if the subsequent diet does not contain the vitamin. It is, however, more economical of vitamin A to give regular and appropriate daily doses than very large doses at long intervals.

In the diet vitamin A is derived from two sources: (1) yellow and green vegetable foodstuffs, such as carrots and greens; (2) animal foodstuffs, notably fish-liver oils, liver, dairy products, eggs, sardines. In the case of the former, the greener the vegetable is, the more vitamin A it contains. Green leafy and yellow vegetables are under many conditions the most important dietary sources of vitamin A.

Vitamin B_1 (aneurin, thiamin)

Riboflavin (formerly known as vitamin B_2, a term now obsolete)

Nicotinic acid (niacin)

These vitamins are all concerned with the utilization of carbohydrate in the body and the production of energy from it. *Vitamin B_1* in cereal grains is largely associated with the germ. It is, however, widespread in small amounts in very many foods (see Table IV). *Riboflavin*, which is also present in cereals to a small extent, is found in richest amount in milk

(see Table 4). *Nicotinic acid*, while found in cereals and vegetable foods, is present in richest amount in meats.

Sugar, white flour (unless " enriched " with vitamins, as in the U.S.A.), highly milled rice, tapioca and sago are foods for the utilization of which the body needs B vitamins, but which are notoriously deficient in them.

Vitamin C must be considered with special care in nutrition for two reasons: (1) it is by no means widespread in foodstuffs, and occurs mainly in fresh vegetables and in fruit; (2) it is fairly readily destroyed during storage and by the processes of cooking. The precise function of vitamin C in the body is not known, but if it is not present in the diet in sufficient amounts, the growth of children will be checked, the gums and mouth will become susceptible to infection, the healing of wounds will become slower and finally the disease of scurvy may supervene.

Vitamin C may be lost in cooking in three ways. Firstly, it is very readily soluble in water and will be lost if the cooking water is discarded. Secondly, it is destroyed by prolonged heating; losses will therefore occur if food is kept hot for some time. Thirdly, when plant cells are destroyed, whether mechanically or by warm water, an agent known as an enzyme in the plant is enabled to come in contact with vitamin C and to destroy it.

In order to overcome this last effect it is important in cooking vegetables to raise them to boiling point as quickly as possible, since at this temperature, the enzyme is itself destroyed and can no longer cause loss of vitamin C. To reduce losses from leaching, vegetables should be cooked in the smallest quantity of water, unless the cooking water is to be used in making soup or sauces.

Vitamin D has already been mentioned as being concerned, together with calcium and phosphorus, in the formation of bone. Vitamin D may be derived from two sources: (1) from milk, butter, eggs, fish-liver oils, and (2) from the effect of sunlight on the skin, causing the formation of vitamin D in the body itself. If vitamin D is being administered in the form of concentrates it is important to ensure that very large

overdoses are not inadvertently given, since this vitamin is one known to cause ill-effect in excess. The dangerous level of dosage is, however, of the order of 200,000 International Units a day, i.e. more than 200 times a large daily dose. A single large dose is not likely to cause harm, but prolonged administration of such a dosage might do so.

Other Vitamins. Nutrition experts recognize today many other vitamins, such as pantothenic acid, pyridoxin and biotin. It is unnecessary to give details of these in a simple exposition such as this. For practical purposes it can usually be assumed that a diet supplying a reasonable intake of vitamins A, B_1, C and D, riboflavin and nicotinic acid, will also provide sufficient of the less well-known vitamins.

6. Other Accessory Substances

Many substances directly affect our nutrition without, so far as we know, providing nutrients in the accepted sense. Into this group come many condiments, flavouring agents, and beverages. The psychological importance of such items of the diet as onions, garlic, coffee, is considerable.

Energy, Physical Work and Calories

The human body is a working machine, differing from the more familiar types of machine such as the internal combustion engine in that it performs work whilst it is under construction and under continuous running repair. But the laws of energy apply just as strictly to the body as they do to a petrol motor or a Diesel engine. You can no more get work out of the human machine if you have not provided the necessary fuel (food) than you can run an engine without petrol or fuel oil. It is vitally important always to bear this fact in mind. If the human body is to carry out physical work the food must provide the necessary energy. There is a precise quantitative relationship.

The energy value of foods is estimated in terms of a heat unit known as the *large calorie*, or, for convenience, but inaccurately as the *calorie*.[1] The *large calorie* is the amount of heat

[1] The calorie, as distinct from the " large calorie ", is the unit representing the heat required to raise the temperature of 1 g. of water 1° C. The large calorie is therefore 1,000 calories.

required to raise the temperature of 1 kilogram of water 1° C. It is a *heat* unit, comparable with the B.T.U. used by engineers to calculate the energy value of fuels for engines. The *average calorie value* of the three major food components serving as sources of energy in our diets are:

1 gm. of carbohydrate	..	4 calories
1 gm. of protein ..	..	4 „
1 gm. of fat ..	..	9 „

Tables of food composition (see Table IV) enable the calorie value of foods to be calculated, e.g.

Wheatmeal bread has the composition 14·2 g. carbohydrate, 2·5 g. of protein and 0·4 g. of fat per ounce. The energy value of 1 oz. of bread is, therefore:
14·2×4=56·8 calories from carbohydrate
2·5×4=10·0 calories from protein
0·4×9= 3·6 calories from fat
Total, 70·4 calories per oz. wheatmeal bread.

Foods rich in fat have high calorie values.
Foods rich in water have low calorie values.

Water is necessary to the life of the body but it does not rank on equal terms as a nutrient. Water provides no energy; its presence in foods, therefore, leaves less room in them for nutrients which do.

The Use of Energy by the Body

When food is digested and its constituents are absorbed, some are used for growth or repair. The proteins, minerals and vitamins are mainly concerned. The carbohydrates and fats and such protein building stones (amino-acids) as are not needed for constructional use are oxidized in the body by a complicated series of chemical changes involving, ultimately, the oxygen breathed into the lungs and transported to every part of the body by the red cells of the blood. These chemical changes release energy in much the same manner that energy

is liberated when coal is burnt or when petrol vapour is oxidized by the oxygen of air in the cylinder of an internal combustion engine. The parallel goes further. Just as part of the energy released in a petrol engine appears as heat and part serves to drive the pistons and operate the machine, so energy liberated in the body is used both to maintain its temperature and to perform physical work.

The maintenance of the normal body temperature is carried on whether or not physical exercise is in progress. Indeed, besides having provision for raising its temperature, the body is equipped with a mechanism for preventing its rising too high. The part of the energy released by a petrol engine as heat is waste energy. The efficiency with which such an engine converts its fuel into driving power is, indeed, only about 20 per cent. Similarly, the efficiency with which the body converts the calories from food into work is only about 15 per cent. Exercise makes a man hot because the remaining 85 per cent. of the energy from food is *wasted*, for the most part as heat.

Two energy requirements of man should be differentiated. One is that needed to keep the body " ticking over ". When lying at rest, fully relaxed and with an empty stomach, the individual is steadily using up energy. The amount is related to body weight (or more accurately to the surface area of the body) and is termed the *Basal Metabolism* or *Basal Energy Requirement*. An " all-over " figure for adult men is about 70 calories per hour and for adult women about 60 calories per hour. Thus with no physical activity whatever the ordinary normal man and woman need about 1,700 and 1,500 calories a day respectively.

The slightest physical effort increases the calorie demand. The harder the physical work, the greater is the need for energy foods.

The calorie needs of an individual are as strictly determined by the amount of physical work as estimates of petrol are related to the distance to be travelled and the load to be carried.

An idea of the order of magnitude of the demands can be obtained from the following figures:

Type of Activity.	*Calories per hour of activity.*
Standing at rest	15
Sedentary work (writing, typing)	20-45
Walking slowly	120
Walking moderately fast	180-200
Moderately active work (light metal work, carpentering)	90-140
Active work (stonemason, heavy metal work)	180-300
Very active (mining, lumbering)	320-380

From such figures can be calculated the daily needs of an individual on a particular job. Thus, for example, a carpenter working 8 hours a day might require about 3,200 calories made up of:

24 hours basal energy needs	1,700 calories
8 hours ordinary domestic activity, say	380 calories
8 hours carpentering	1,120 calories
	3,200 calories

The *basal needs of adult women* are about 10 per cent. less than those of *men.* This is related to their smaller physique. It is important to note, however, that the energy needs of women for doing manual work are for all intents and purposes the same as those of men—if the same work is done. The energy requirement of a woman doing carpentering as set out above, would be about 200 calories less, i.e. 3,000 calories a day, the difference being chiefly one between the respective basal figures of 1,700 and 1,500 calories.

Estimates such as these are comparable with those obtained by determining the energy value of the daily food eaten by various types of workers. Here is a selection of the latter taken from wartime studies by the Ministry of Food:

Men.		*Women.*	
Light engineering	2,700	Light engineering	2,300
Shipbuilding	3,300	Cotton spinners	2,400
Steel rollermen	4,000	Railway goods loaders	3,200
Coalminers	3,500-4,500		

What happens when more food is eaten than is needed for the energy output of the day's activities?

The surplus is laid down as fat. By and large, it is true to say that people who have layers of fat have eaten more than they need.

What happens when less food is eaten than is needed to supply the energy of the day's activities?

The additional energy is provided by sacrificing food reserves of the body. That means that body weight falls.

Carbohydrate reserves in the liver go first. These are small and serve to provide energy for a few hours only. They will not last more than 24 hours.

Fat reserves go next. The fat layers under the skin gradually disappear, so also do the deposits inside the abdominal cavity. As the fat is used up, the weight of the body falls.

Protein reserves begin to go when the fat is being used up. There is order in the sacrifice, because the muscles of the skeleton give up protein and shrink before the muscle of the heart or vital organs such as the kidney suffer. Body weight continues to decline.

Body weight of adults *is a reliable indication of calorie sufficiency or inadequacy. Unless the picture is complicated by a wasting disease it is safe to assume that adults who are about the right weight for their height are getting an adequate calorie intake.* If they are overweight or gaining weight they are eating more than they need. If their calorie intake is insufficient to meet their energy output they will be underweight or their weight will fall.

CHAPTER 2

NUTRITIONAL REQUIREMENTS

NUTRITION is rapidly becoming a quantitative science to-day. It is not enough to enquire whether the diet *contains* vitamin C, or animal protein, or calcium. The question to be asked is, does the diet contain *adequate amounts* of each nutrient to satisfy the daily physiological needs of the types of individuals for which it is intended ? Enough to eat, in the final analysis, does not mean enough bread, or enough soup, or enough potato; it means enough of each of the *nutrients* of which food is composed.

Estimates can be made of the amounts of nutrients needed by various groups of the population, such as children, or adults, or expectant mothers, or coalminers for full health and efficiency. One set of estimates are those regarded as the figures of " *optimum* " *requirements.* No increase in food consumption providing more nutrients than those represented by the " optimum " figures would produce any improvement in nutrition. There are few parts of the world where an " optimum " diet is readily available under existing conditions. A recent assessment of the needs for " optimum " nutrition is that made in 1941-2 by the National Research Council of the U.S.A. The figures are the *recommended dietary allowances* given in Table I. In putting forward these recommendations, however, the N.R.C. realized that their figures might, in some respects, represent targets difficult of attainment, particularly in impoverished countries or under wartime conditions. The Council regarded these " allowances " as a " tentative goal toward which to aim in planning practical dietaries ". They are, however, admitted to be liberal and difficult of fulfilment under conditions prevailing in many countries. Indeed, wartime experience in Great Britain has

TABLE I—*Recommended*

(*Restricted dietary*

Food and Nutrition Board,

	Calories.	Protein Grams.	Calcium Grams.
Man (70 Kg.):			
Sedentary	2500	70	0·8(0·56)
Moderately active	3000		
Very active	4500		
Woman (56 Kg.):			
Sedentary	2100	60	0·8(0·56)
Moderately active	2500		
Very active	3000		
Pregnancy (latter half)	2500	85	1·5
Lactation	3000	100	2·0
Children up to 12 years:			
Under 1 year[4]	100/Kg.	3 to 4/Kg.	1·0
1-3 years[5]	1200	40	1·0
4-6 years	1600	50	1·0
7-9 years	2000	60	1·0
10-12 years	2500	70	1·2
Children over 12 years:			
Girls, 13-15 years	2800	80	1·3
16-20 years	2400	75	1·0
Boys, 13-15 years	3200	85	1·4
16-20 years	3800	100	1·4

[1] Tentative goal toward which to aim in planning practical dietaries; can be met by a good diet of natural foods. Such a diet will also provide other minerals and vitamins, the requirements for which are less well known.

[2] Requirements may be less if provided as vitamin A; greater if provided chiefly as vitamin C, the pro-vitamin carotene.

[3] 1 mg. thiamin equals 333 I.U.; 1 mg. ascorbic acid equals 20 I.U.

[4] Needs of infants increase from month to month. The amounts given are for approximately 6-8 months. The amounts of protein and calcium needed are less if derived from milk.

[5] Allowances are based on needs for the middle year in each group (as 2, 5, 8, etc.) and for moderate activity.

[6] Vitamin D is undoubtedly necessary for older children and adults. When not available from sunshine, it should be provided probably up to the minimum amounts recommended for infants.

Dietary Allowances[1]

allowances in brackets)

National Research Council

Iron mg.	Vitamin A[2] I.U.	Thiamin (B_1) mg.[3]	Riboflavin mg.	Niacin (Nicotinic acid) mg.	Ascorbic acid mg.[3]	Vitamin D I.U.
12(8·5)	5000(3500)	1·5(1·1) 1·8(1·3) 2·3(1·6)	2·2(1·5) 2·7(1·9) 3·3(2·3)	15(10·5) 18(13) 23(16)	75(52)	[6]
12(8·5)	5000(3500)	1·2(0·8) 1·5(1·1) 1·8(1·3)	1·8(1·3) 2·2(1·5) 2·7(1·9)	12(8) 15(10) 18(13)	70(49)	[6]
15	6000	1·8	2·5	18	100	400 to 800
15	8000	2·3	3·0	23	150	400 to 800
6	1500	0·4	0·6	4	30	400 to 800
7	2000	0·6	0·9	6	35	[6]
8	2500	0·8	1·2	8	50	
10	3500	1·0	1·5	10	60	
12	4500	1·2	1·8	12	75	
15	5000	1·4	2·0	14	80	[6]
15	5000	1·2	1·8	12	80	[6]
15	5000	1·6	2·4	16	90	[6]
15	6000	2·0	3·0	20	100	

Further Recommendations, adopted 1942:

The requirement for iodine is small: probably about 0·002 to 0·004 milligram a day for each kilogram of bodyweight.

This amounts to about 0·15 to 0·30 milligrams daily for the adult. This need is easily met by the regular use of iodized salt; its use is especially important in adolescence and pregnancy.

The requirement for copper for adults is in the neighbourhood of 1·0 to 2·0 milligrams a day. Infants and children require approximately 0·05 per kilogram of body weight. The requirement for copper is approximately one-tenth of that for iron.

The requirement for vitamin K is usually satisfied by any good diet. Special consideration needs to be given to newborn infants. Physicians commonly give vitamin K either to the mother before delivery or to the infant immediately after birth.

shown that a good general state of nutrition is compatible with lower levels of intake of vitamins and minerals, particularly in the case of adults, and as can be seen below (pages 24, 25 and 26) there is not yet unanimity among experts on the precise requirements of many nutrients.

A practical purpose is served, therefore, by using an alternative baseline, representing **" restricted dietary allowances "**. They are derived as follows:

(*a*) Full optimum requirements for pregnant women, nursing mothers, infants and children.

(*b*) 70 per cent. of optimum requirements for *minerals* and *vitamins* for all adults other than expectant and nursing mothers. All other requirements 100 per cent.

In Table I the " restricted dietary allowances " are given in brackets.

The following notes on these " allowances " may be useful.

1. Calories

If physical work is done by an individual, efficiency will be impaired if the food eaten is not of a calorie value sufficient to furnish the energy needed for that work. Sooner or later calorie insufficiency is revealed by inability to carry out physical work without undue fatigue and by irritability, apathy and discontent. (See Chapter 3, p. 29.)

It must be borne in mind that there is a wide range of calorie needs of individuals within any one group. Thus, for example, a group for which the overall estimate is 3,000 calories a day may include individuals whose needs range at least from 2,500 to 3,500.

It is sometimes convenient to apply an overall calorie estimate to the whole adult population if data regarding numbers in various categories are not available. *For practical purposes*

the estimates of 3,000 calories daily for men and 2,500 for women (other than nursing mothers) will serve.

2. Protein

A question that often arises is what proportion of the total protein should be in the form of "animal" or so-called "first-class" protein. Nutrition experts cannot give a satisfactory answer. As pointed out in Chapter 1, p. 9, it is possible to provide mixed proteins of good nutritive value by an almost exclusively vegetarian diet, but this requires the right choice of grain, pulses, root and green vegetable foods.

On the other hand, animal protein foods are so firmly established as an important part of Western European diets that their rôle may be of more significance from the psychological than from the strictly nutritional aspect. To reduce the consumption of meat, milk, eggs, cheese and fish greatly below the levels to which people are accustomed may impose hardship that can indirectly affect health in an adverse manner. This applies particularly to the diet of adults.

In considering the part played by "animal" protein one should always take into account the food habits of the people concerned (see Chapter 5). Meat is one thing in the diet of western Europe; it has quite another significance in the diet of Balkan peasants. The psychological aspect of the customary forms of "animal" protein eaten in various countries is of very great importance in thinking of nutritional problems.

For young children "animal" protein in the form of milk is of very great importance. Milk is also an important source of "animal" protein in the diet of pregnant women and nursing mothers. Their need for good protein is greater than that of the ordinary woman because they have to provide either for the growth of the foetus or for the formation of milk in the breasts.

The following figures serve as a rough guide to what can be regarded as nutritionally good daily intakes of "animal" protein when diets of the type commonly eaten in western Europe are being considered.

	Daily protein intakes.	
	Total protein.	*Animal protein.*
	g.	g.
Children 0-5 years old ..	15-45	15-25
Children 5-14 years old ..	45-75	25-40
Adolescents 14-18 years old	75-90	40
Adults	60-70	25
Pregnant women ..	85	40-50
Lactating women	100	50-75

3. Calcium and Iron

Every effort should be made to maintain the " optimum " intakes for pregnant and nursing women and children and at least the " restricted " intakes for all adults. There is no divergence of opinion among experts on these figures.

4. Vitamin A

Intakes of vitamin A of the order of the " optimum " estimates are undoubtedly beneficial to health, but they are often difficult to achieve. There are indications, however, that these optimum estimates are on the high side. Wartime experience in Great Britain suggests that intakes of the order of 2,500-3,000 International Units (I.U.) daily by ordinary adults are compatible with good general health. Intakes lower than 1,500 would raise fears of gradual depletion of the reserves stored in the liver—with eventual appearance of symptoms of vitamin A deficiency (see p. 34). In fairly well nourished individuals the stores in the liver may suffice to supplement a diet of low vitamin A content for as much as a year or eighteen months, after which deficiency conditions gradually become manifest. People who have been on a poor diet will have reduced reserves and will be more liable to develop disorders due to vitamin A deficiency. It is particularly important to ensure high intakes of vitamin A for pregnant and nursing women.

5. Vitamin B_1 (Aneurin, Thiamin)

This vitamin, unlike vitamin A, is not stored to an appreciable extent in the body. Little margin can be allowed below

the " restricted " figures given in Table I if actual deficiency is not to make itself apparent.

6. Riboflavin

The " optimum " estimates set out in Table I are thought by some authorities to be on the high side. Some even regard the " restricted " estimates as ample. It is probable that an average figure of 1·8 mg. a day represents a reasonable intake.

7. Nicotinic Acid

There is also disagreement between experts on the requirements for this vitamin. Some regard the " optimum " figures in Table I as high. It is possible that a daily intake of 12 mg. is sufficient for ordinary adults.

8. Vitamin C

The recommended allowance of 75 mg. of vitamin C for men and 70 mg. for women is probably an " optimum " figure. Even the " restricted " estimate of 52-49 mg. (70 per cent. of the recommended value) is regarded by some experts as ample. The League of Nations Technical Committee on Nutrition suggested in 1935 that 30 mg. daily was adequate for health and it can be accepted that if this amount is taken in the food eaten no signs of deficiency need be expected, even though larger amounts will perhaps be beneficial to health. Although vitamin C is not, strictly speaking, stored in the body, scurvy takes several months to develop in a previously well-nourished individual who is obliged to live on a C-deficient diet.

It is generally thought that intakes of 15 mg. or less are smaller than desirable. When there is less than 10 mg. a day in the food eaten over a period of several months, the individual will be in danger of suffering from the effects of deficiency. Less than 5 mg. a day over a long period would raise fear of scurvy appearing.

In calculating the amount of vitamin C in the food available, it is essential to remember that approximately 50-60 per cent.

of the vitamin C in vegetables is almost inevitably lost in cooking. It is also important to bear in mind that the vitamin C content of potatoes is highest when they are first dug from the soil and thereafter decreases continuously throughout the period of storage. (Figures are given in the table of food composition in Table IV, page 74.)

9. Vitamin D

It is not possible to provide precise estimates of the need for vitamin D, (1) because exposure of the skin to sunlight greatly decreases the need; vitamin D being produced under the action of sunlight on the skin, and (2) because the need for vitamin D is influenced by the amounts of calcium and phosphorus in the diet and also by the ratio between these two quantities. On diets of good calcium content, that is with amounts between the "restricted" and the "optimum" calcium estimates given in Table I, the need for vitamin D is much less than it is when there is a deficiency of calcium.

It is probable that ordinary adults on a diet providing more than 0·6 g. calcium and with a not unduly large amount of phosphorus have an almost negligible need for vitamin D, but on this point more evidence is required before a definite statement can be made.

Requirements of Groups of Individuals or of Populations

The *per capita* requirements of such groups can be estimated in the following manner:

1. Divide the population or groups into categories—pregnant women, children, heavy and light workers, etc.—and obtain numbers in each group.
2. Apply either the "optimum" or the "restricted" estimates figures in Table I, depending on circumstances, to each group.
3. Derive from these data a weighted *per capita* requirement for the whole group or population.

These weighted data will, of course, represent the nutrient requirement to be provided by the food as eaten.

Typical figures are those recorded for the civilian populations of the U.S.A. and United Kingdom for 1943 (Table II).

TABLE II

Estimated Nutrient per capita Requirements of 1943 Civilian Populations

	U.S.A.		U.K.	
	"Optimum" Requirement	"Restricted" Requirement	"Optimum" Requirement	"Restricted" Requirsment
Calories	2531	2531	2546	2546
Protein g.	65·2	65·2	64·6	64·6
Calcium g.	0·9	0·79	0·91	0·75
Iron mg.	11·74	9·6	11·7	9·3
Vitamin A I.U.	4560	3650	4664	3660
Vitamin B_1 mg.	1·45	1·2	1·47	1·1
Riboflavin mg.	2·15	1·7	2·2	1·7
Nicotinic acid mg. ..	14·5	11·0·	14·7	11·0
Vitamin C mg.	70·7	58·0	71·0	57·0

Relation of *per capita* Estimate of Nutrient Requirements to Estimates of Nutritive Value of Food Supplies Available

It is very important indeed to bear in mind that the estimates in Table II represent the nutrients in the food as eaten. Over and above the quantities of foods required to provide these nutrients, allowance must be made for the losses that will inevitably occur during transport, distribution, marketing and in the home. It is a very difficult matter to give a figure covering the margin for wastage. In pre-war years the total food supplies for most of the European countries represented *per capita* calorie provision within the range 2,750 to 3,200. These figures indicate that wastage can be as high as 20 or 25 per cent. in times of peace. Under war conditions, or when

supplies are short, wastage may be reduced. On the other hand, if transport and distribution difficulties are unusually great they may lead to increased loss.

There is evidence from food consumption studies in the United Kingdom, that under prevailing conditions the wastage can be reduced to something like 10 per cent., when every effort is made to economize the use of available food. Thus, for the year 1943, the total calories per head per day available for civilian consumption at the retail stage of distribution was 2,827 calories, as compared with the estimated nutritional requirement of 2,546. The *pre-war* figure for the total food supplies of the U.K. 1934-8 was 2,984 calories per head per day. As there is certainly a larger total of physical work being performed by the population now than there was in 1934-8, the inference is that there was then a considerably higher proportion of wastage.

Chapter 3

THE EFFECTS OF UNDER-NUTRITION

The Effects of Starvation

Total starvation, that is, deprivation of food and water, causes death in a relatively short time, at most a few days. If water is available the period of survival is greatly increased. Its length depends on the reserves originally carried by the body, and on the amount of energy expended in physical activity whilst there is deprivation of food. There are authentic cases of individuals recovering after refraining from all food for 50-60 days but with water to drink.

Body weight steadily falls as the reserves of fat are used up and as muscles waste to provide further energy for survival. Individuals differ, but loss of weight of the order of 12 per cent. at the end of 20 days and about 25 per cent. after 6 weeks are fairly typical.

Collapse and death from starvation come with startling suddenness. The actual cause of the rapid fatal termination is not known with certainty. Resuscitation after the terminal phase has begun is very difficult to achieve. The condition demands skilled medical treatment. Ordinary food is useless. It is not digested. Intravenous administration of glucose and amino-acids may sometimes save the patient and restore ability to take and make use of easily digested foods, but experience with this new form of emergency treatment is as yet slight.

Total starvation is relatively rarely seen.

Partial starvation may be of any degree of severity. When fairly severe and prolonged it is characterized by:

(*a*) *Progressive loss of weight.* The rate of loss is determined by the extent to which the food is insufficient to provide the necessary energy and by the output of energy by the body. Loss of weight is accelerated by physical effort.

(*b*) *Lethargy and apathy.* These reflect an attempt to economize energy. Half-fed people try to conserve calories by resting, staying in bed, keeping as warm as possible. They are disinclined to work, and they tire easily.

(*c*) *Reduction of basal energy needs.* An adjustment occurs in the body when it is undernourished in respect to calories. The basal energy needs (see p. 16) are reduced so that the body tends to adjust itself to a lower rate of "ticking over". An underfed man may have a basal energy need of, say, 1,500 calories a day instead of his normal 1,700. This phenomenon is not yet fully explained but an adjustment of the action of some of the glands, particularly the thyroid, seems to be concerned. This doubtless accounts to some extent for the lethargy and listlessness of undernourished people.

(*d*) *Reproduction* is affected by a marked suppression of the sexual urge.

(*e*) *Hazards of pregnancy are increased.* A badly undernourished woman cannot obtain sufficient from her food to build the child growing in her womb. Up to a point her own tissues are utilized in an effort to make good the deficiency. Fat disappears and muscles waste to help the foetus develop. This sacrifice greatly endangers the health of the woman during her pregnancy. If a child is born alive, and at about the normal time, it may not be greatly underweight but the mother is left in a grievously debilitated and emaciated condition. All too often, however, pregnancy terminates prematurely with the death of the child.

(*f*) *Lactation may fail in mothers.* Half-starved women cannot produce the milk needed for their infants. The milk flow may cease soon after birth or give out long before the usual time.

(g) *Resistance to disease is impaired.* Undernourished people readily contract infectious or contagious diseases.

Effects of Partial Starvation on Children

The first, and immediate, effect of insufficient food on a child is retardation or cessation of growth. Later, weight may be lost. The calorie needs of growing children are relatively high (see Table I, page 20); a boy or girl of 12 or more needing quite as much food as an adult of 25 or 30 years. This is explained by the relatively large ratio between body surface of a young child and its weight; children lose warmth more readily than adults.

Quite well fed children sometimes show retardation of growth as a result of calorie shortage. Boys and girls in boarding schools where they may not be able fully to satisfy appetite sometimes show poor growth during the term time and subsequently rapid development during the holidays. This is often related to their calorie intake rather than to differences in the quantities of nutrients provided by the diets.

Prolonged retardation of growth in children leads to permanent stunting if final hardening of the bones occurs before the nutritional defects can be rectified. Once the bones are finally hardened, normally in late adolescence, no further growth can occur.

Sometimes retardation of growth in young children is associated with *improved bone formation.* Rickets is a disease associated with rapid growth. It is less likely to occur when the calorie value of the daily diet is below that necessary for a good rate of growth. Underfed children are usually listless, apathetic and easily tired. They show poor resistance to infective diseases.

Partial Starvation and Deficiency Diseases

It does not always follow that deficiency diseases are associated with partial starvation, although many people tend to assume that they are. A measure of protection is provided by the

consumption of breads made from cereal flours of long extraction (over 85 per cent.). These often provide ample vitamins of the B group, having regard to the fact that the need for them is reduced proportionally with the calorie level of the diet (see p. 36).

Besides the enforced consumption of long-extraction flours in times of shortage, vegetables often save the situation so far as vitamin and mineral deficiencies are concerned. Hard times stimulate the cultivation of vegetables wherever a patch of ground can be found to provide something to eke out the bare rations of staple foods. Between them, long extraction flour and vegetables may lessen materially the danger of recognizable deficiency diseases appearing.

This point can be illustrated from the record of a scientific and clinical examination of a working-class population living in the outskirts of Madrid.[1] Examined in 1941, these people had been seriously short of staple foods for over four years. The median calorie intake (per male consumption unit) was 1,543; total protein was about 63 g. and the animal protein 18 g. Bread supplied more than half the calories. Very little milk was available; meat, cheese and eggs were practically unobtainable; most of the animal protein was fish. Vegetables were grown and eaten whenever possible, sometimes the amount was so large as to make a significant contribution to the calories. *Such conditions as these facts represent may well be found in some parts of Europe.*

What was the nutritional picture presented by the Madrid population? A large proportion of the 500 children and adults examined were underweight. Subcutaneous fat was scanty. About one-third of children showed flaring rib margins and flaccid abdominal muscles. There were only two cases of rickets, largely because of the sunny climate. The incidence of classic deficiency disease was slight. There were two cases of nutritional oedema (see p. 34), one case of chronic pellagrous dermatitis (see p. 38). No cases of clearcut deficiency of vitamins A, B_1, C or riboflavin were seen.

[1] *J. Nutrition*, 1942, xxiv, 557.

About one-third of the subjects examined had a mild anaemia of a type associated more with protein deficiency than shortage of iron.

Deficiency Diseases

In Chapters 1 and 2 have been set out the normal constituents and make-up of a diet adequate for good nutrition.

It is proposed to consider now some of the conditions generally recognized as due to a lack of these various essential substances.

The conditions are commonly referred to as deficiency diseases or as diseases of malnutrition, terms which properly embrace any condition which is due to a lack of any essential, be it calcium or iron, protein or vitamin, but often used in a more restricted sense for those diseases associated with vitamin deficiency.

It is with this last group that it is here proposed to deal chiefly; for whereas the actual diagnosis must rest with medical men with considerable experience of deficiency diseases, many opportunities may be given to those who are engaged upon other work, to make valuable observations, provided they possess some general knowledge about the conditions likely to be encountered.

Such observations might well lead to the recognition of conditions which might otherwise fail to come to light. Their value may often depend upon the fact that a number of persons or children are suffering from the same disorder. It is hardly to be expected that a single case of some deficiency would be recognized. It should be remembered that conditions listed as occurring in the various deficiencies are not necessarily specific for them, but may be due to pathological states which in turn depend on a number of other factors—for example shortage of breath due to cardiac weakness.

For these reasons it is of value, if collecting material for a report, to mention whether the area is rural or urban, the number of those affected and total population, the sex and age of the group, together with the symptoms and the local name of the affection.

Severe wasting (*inanition* in adults and *marasmus* in children) due to simple starvation is often distinguished from malnutrition in the sense of deficiency disease in that though there may be extreme loss of weight, disappearance of fat and wasting of muscles, the signs of vitamin deficiency are wanting. All the tissues lose their normal content of *water* (dehydration) and any further loss associated with diarrhoea and vomiting due to some intercurrent infection commonly proves fatal.

Anaemia due to deficiency of *iron* in the diet is common to many conditions. Facial pallor should never be taken to indicate anaemia, especially among the pale and sallow-skinned peoples of Southern Europe. Pallor of the inner surfaces of the lips and cheeks is a more reliable sign. A deficiency of protein may also give rise to a form of nutritional anaemia.

Famine Oedema has been considered to be due to a gross deficiency of *protein*, but probably a deficiency of fat and carbohydrate also plays a part, possibly associated with a high intake of salt; the total calorific value of the diet is at all events low. Cure follows the administration of an adequate amount of protein.

The condition may be looked upon as a more severe degree of inanition and may appear among the underfed when forced to manual labour. The symptoms consist essentially of general muscular weakness and oedema (or dropsy), which may be comparatively slight or marked, affecting the lower limbs, the body and even the face. Shortness of breath due to affection of the heart may be present. Fever and diarrhoea may occur, also purplish red blotches on the skin. The affection may, of course, co-exist with other deficiency diseases.

Vitamin A is associated in the maintenance in a healthy state of the epithelial cells forming the envelope (skin) and lining membranes of the cavities of the body and the glands in connection with them.

In vitamin A deficiency the skin becomes dry and rough, the horny layer is thickened especially about the pores of the skin whence emerge the hairs (the pilo-sebaceous follicles). These follicles stand up like goose-skin and present a horny cap under which the hairs are impounded; or their contents

may form horny plugs which stick out of the follicles and give, when touched, a nutmeg-grater sensation.

They are found chiefly on the front and sides of the thigh, the back of the arm, on the shoulders and abdomen; they are often pigmented. The changes in the bronchial tubes and gastro-intestinal tract lead to a loss of the normal resistance to infection so that bronchitis and enteritis result with catarrh and diarrhoea.

Two other symptoms require special mention. "Night-blindness" or failure of "dark-adaptation" may be commonly complained of; the sufferer finds that on leaving a lighted room and going out into the night his sight fails him completely and he cannot get about in consequence. The condition is due to a disorder in the formation of "visual purple" in the retina for which vitamin A is necessary.

The second condition, more commonly seen in children, is of the greatest importance in that, if untreated, blindness and destruction of the eyes may result. This affection is exactly comparable with that of the skin; the conjunctiva becomes dry, thickened and wrinkled (xerophthalmia) with the formation of "foamy" areas and whitish spots on the exposed part of the globe of the eye,[1] to each side of the glassy part of the eye (cornea). Later the cornea itself is involved; it loses its lustre, becomes dull and opaque. Infection may then occur with resulting ulceration and loss of the eye. The child, which in many cases may show little else except delayed growth, will show a dislike of exposure to bright light and if old enough might complain of sensations of sand in the eyes; sticky discharge may be noted by an observer.

Vitamins of B Group

Included in this group are a number of food factors which are closely bound up with the utilization by the body of carbohydrates, to which they bear a quantitative relationship, so that when the diet is made up largely of starchy foods the amount of B vitamins required is increased.

[1] Not to be confounded with yellowish thickenings (pterygium) often to be noted in older people in the same areas of the conjunctiva.

When the utilization of carbohydrate is raised, as during manual labour, pregnancy, lactation, febrile illness, etc., the vitamins are used up more quickly and a relative shortage ensues. Unless they are supplied in the diet and the balance restored symptoms of deficiency will appear.

Although certain groups of symptoms are severally identified in our minds as a rule with deficiencies of certain vitamins, it has to be remembered that it is not uncommon for deficiencies of several vitamins, especially those of the B group, to occur in the same person.

Vitamin B_1 (aneurin or thiamin) is the vitamin associated with the prevention of *beriberi*, a disease usually described as occurring in two forms, " wet beriberi " and " dry beriberi " according as to whether dropsical or neuritic symptoms predominate.

In the former there is marked oedema dropsy, involving the whole body, associated with enlargement of the heart, breathlessness and cyanosis; in the latter the peripheral nerves are the seat of a neuritis giving rise to crampy pain, tenderness of the muscles to pressure, loss of skin sensation, muscular wasting and paralysis causing " wrist-drop " and " foot-drop ". The general symptoms may be headache, insomnia, loss of appetite, constipation or diarrhoea, giddiness, visual and auditory intolerance.

A special form of *beriberi in infants* at the breast is distinguished, due to lack of vitamin B_1 in the mother's milk while she herself may commonly show no symptoms of the disease. The infant about the tenth to twelfth week of life begins to refuse the breast or vomits any milk taken, while it will drink water with avidity; increasing restlessness, abdominal tenderness and distension occur with vomiting and paroxysmal screaming. There is constipation and diminution in the amount of urine. There follows acceleration of the heart beat up to 200 per minute, rapid breathing, breathlessness, cyanosis, generalized oedema and signs of fluid accumulating in the chest and belly. The voice is often lost or the infant emits a peculiar grunting sound. Later rigidity, twitching, drowsiness, coma and death supervene unless the condition is

recognized and immediate treatment instituted. Each phase may only last a matter of hours and the whole illness only a day or two.

Riboflavin Deficiency

The symptoms of riboflavin deficiency often accompany or precede those of nicotinic acid deficiency in pellagra, but may also occur disassociated from that disease, or when the diet is deficient in many factors they may be the first to be noted, thereby being of particular importance.

The sufferer complains of soreness of the lips and tongue, gritty sensations in the eyes, dislike of strong light, dimness of vision and dullness of hearing and irritation about the genitals. The corners of the mouth show a heaping-up of whitish sodden skin with fissuring, sometimes prolonged on to the inner surface of the cheek. A similar condition may be found at the corners of the eyelids, about the nostrils, prepuce, vulva and anus, while the scrotum is covered with a kind of eczema.

The lips are sore, reddened and cracked.

The tongue is of a purplish red or magenta colour and presents a cobblestone appearance; later stripping of the papillae at the sides and tip may be noted or irregular denudation occurs. The skin of the body may be roughened with fine peeling, but more often scaly patches are noticed about the mouth and chin, the naso-labial folds and sides of the nose.

The conjunctivae are often reddened and the eyes may appear bloodshot.

Associated with these signs there may be symptoms referable to the nervous system—" burning pains " often chiefly in the soles of the feet, sensations of pricking or numbness chiefly in the legs, sense of muscular weakness, tremulousness, staggering gait (ataxia) but no loss of sensation and no paralysis. In one area, it is common to find perhaps the majority of sufferers only exhibiting some particular group of symptoms or " syndrome ". Thus the children may show sore lips, tongues and the affection of the corners of the mouth. Some adults may complain chiefly of the loss of

visual and auditory acuity; others of the "burning pains" in the limbs and ataxic gait.

Nicotinic acid

This is sometimes called the *pellagra* preventive vitamin. *Pellagra* has been prevalent in the past in nearly all the countries of Southern Europe, from Spain to the Balkans and Southern Russia, commonly among populations whose staple food substance is maize, not, however, because maize in any way causes pellagra, but because those who live on maize generally partake of an all round poor diet.

The disease is characterized by the fact that the symptoms tend to occur each spring, and to disappear in the late summer.

The specific symptom, which gives the affection its name, is the dermatitis—an acute symmetrically disposed inflammation of those areas of skin uncovered by clothing and exposed in winter to cold and to sunshine in the spring—including the face, with a "butterfly" distribution over the cheeks and nose, back of the neck, lower part of the throat and upper part of the chest, backs of the hands, arms, legs, etc.

The condition resembles severe sunburn but is a dusky red in colour and followed by deep pigmentation and desquamation, sometimes scab formation and ulceration. The inner lining of the mouth is fiery red and the tongue denuded, thin and the colour of raw beef; together with the gullet, they are intensely sore, and mastication and swallowing almost impossible; salivation is marked.

With these signs there are commonly headache, giddiness, insomnia, loss of weight, increasing muscular weakness, dyspeptic symptoms, abdominal pain and constipation, followed later by intractable diarrhoea.

Mental symptoms, very diverse in character, supervene in a considerable proportion of cases. They may be of neurasthenic type, a state of anxiety, irritability, inability to concentrate, hypersensitiveness to all stimuli, a sensation of fullness in the head, depression, etc., symptoms which in an endemic area may be of pellagrous origin in the absence of the more ordinary signs; or the depression may pass into a definite melancholia,

with phobias and delusions, agitation, delirium or stupor and dementia.

Infantile Pellagra

Under this term have been described cases of infants being fed on very defective diets in whom the signs suggest a mixed deficiency of nicotinic acid, riboflavin and possibly other factors.

The skin of the arms, legs, elbows, buttocks and abdomen, i.e. areas subject to irritation, may be affected with a crazy-pavement kind of effect. There is irritability, photophobia, muscular weakness, pallor, depigmentation of the hair, diarrhoea and oedema of the lower limbs.

Vitamin C—the anti-scurvy vitamin

The earliest signs of *scurvy* are a dry, muddy looking skin with the formation of dry horny papules, resembling very much those described in vitamin A deficiency, most commonly on the buttocks and backs of the legs, accompanied by a sense of fatigue, pain and weakness in the limbs.

Then the gums around the tooth sockets are noted to be red, swollen and soggy; they bleed easily. (No changes occur when teeth are not present.)

Tiny haemorrhagic spots (petechiae) may be found on the legs round the hair follicles, and bigger subcutaneous haemorrhages like big bruises occur.

Extensive haemorrhages may take place under the fibrous periosteum of the long bones or into muscle such as the muscle of the calf, giving rise to a wooden-like hardness to the part. Such a haemorrhage may indeed be the first sign of scurvy and give rise to difficulty in diagnosis.

Similarly, severe haemorrhage may occur from the nose, from the kidney or from the bowel.

In infants scurvy usually manifests itself in haemorrhages in the leg muscles about the joints. The child is pale and fretful and screams when the tender swellings are touched or the limbs moved.

Vitamin D—the anti-rachitic vitamin

Rickets is most commonly seen in children between the ages of 6 to 12 months, but may occur as early as 3 months of age or at any age later.

The disease is due to a disorder of bone calcification caused by the vitamin deficiency. It may be revealed by the bending of the shafts of the long bones and by deformities at their extremities. The thigh bones and tibiae are bowed, and wrists enlarged, the upper ribs are depressed, the breast bone prominent, the lower ribs everted, the rib-cartilage joints are swollen.

The child is flabby and pale; though it may be fat it is often unhappy awake and restless asleep, and suffers from catarrhal infections and irregularity of the bowels, sometimes spasms and convulsions.

A disturbance of calcium metabolism in women is known as *osteomalacia.* In this condition calcium salts are gradually withdrawn from the bones as a consequence of long subsistence on a diet of low calcium content. The withdrawal of the hard mineral salts leads to softening of the bones. The disease is characterized by tenderness and aching in the bones and muscular weakness. The softening of the bones produces marked distortion of the bones of the limbs and pelvis.

Chapter 4

METHODS OF SURVEYING

The Relief Scheme

1. A scheme of food relief should aim at raising the level of nutrition in the whole population or in certain priority groups according to the needs of the locality and the supplies available to meet them.

2. It may vary from the full-scale provision of food, fuel, equipment, clothing, transport, medical service, temporary housing and personnel, to a limited scheme of supplementary supplies for priority groups through maternity and child welfare centres or for school canteens or even for essential workers only. The need might even be for a long-term scheme of assistance to agriculture or transport, with immediate relief unnecessary.

Purpose of the Survey

1. Before a relief scheme is put into operation, the area to be covered should be surveyed in order to discover facts about the number of persons needing help, their state of nutrition, the supplies available and those needed in addition, the transport and fuel situation, the existence or not of means of storage and distribution and of facilities for cooking and feeding in communal or family groups. Only when these facts have been established is it possible to decide what scheme is most applicable to the area and how supplies can be used to the best advantage. Much of this investigation will have to be done by workers with little training or field experience in this kind of work. It is important that they should understand the purpose of the survey and what is the essential information to be collected, and how to make a report.

2. The main object of a survey is to provide information from which the headquarters of the relief organization can assess the needs and relative needs of areas surveyed, and

decide on the relief scheme to be started. Information collected about the nutrition and health of the population may also be used as a basis for scientific and medical research, but the detailed diagnosis and treatment of cases of deficiency disease is primarily a medical matter not coming within the province of a general investigator. Individual cases of developed deficiency disease may be symptomatic of general deficiency, and field workers can provide a useful service in recording objectively such signs and symptoms as they find; they should be careful not to cause confusion by diagnosing unspecific signs and symptoms as evidence of specific deficiencies.

Method

The survey falls into three parts:

1. The collection of statements from officials and from other sources.
2. The interviewing of sample consumers.
3. The taking of weights and measurements and other clinical data on the state of nutrition of selected groups.

These three parts may take place simultaneously or successively, depending mainly on the size of the team undertaking the survey and the time at their disposal.

Relief workers should remember that a few accurate facts are worth a host of vague impressions and ill-founded statements, and every effort should be made to verify the accuracy of the information collected. The source of information should always be stated in any report.

The information collected about an area by survey will depend to some extent on the information already known at relief headquarters and on the objects of the administration. In general it falls under the following headings:

1. Type of locality—urban; rural; dense industrial.
2. Population—probable numbers; additions to normal population, i.e. refugees, military; nationalities;

political groupings; languages and dialects; religions.

3. Housing and feeding—what proportions living in their own houses, cooking at home, needing communal feeding? What facilities for communal feeding?
4. Local Government—conditions and responsibilities.
5. Medical and social services existing.
6. State of nutrition of the population.
7. Health of the population, including incidence of epidemic diseases; vital statistics.

Official Information. Much of this information can only be obtained from official sources; for instance, though refugee camps or an occupying army may be obvious enough additions to the population, their precise size (as also the precise number of the population) cannot be ascertained by cursory inspection. Thus the existence of a local government in any form is of immense assistance, though naturally the conditions under which it operates—whether under military or civilian control, how far it is responsible to a central government—are relevant factors. Again, it is important to know whether the local government is in any way responsible for and in control of rationing, policing and the public services such as transport, housing, sanitation, water supplies and medical services. The scheme of relief suitable in an area depends on all these circumstances and also on the functioning or not of such auxiliary social services as schools, hospitals, maternity and infant welfare centres, tuberculosis clinics, and feeding centres.

In the main, the assessment of the state of nutrition can only be a rough estimate from knowledge of the past and present conditions of food supply, supplemented by anthropometric and clinical data obtained by the examination of individuals—for instance accurate information on the heights and weights for age of a random sample of schoolchildren if standard curves exist for comparison. Except under conditions more settled than early relief workers are likely to find, anything in

the nature of accurate surveys of diets either by the family budget or meal-weighing method is impossible; in institutions or even camps where all food is under the control of some authority a fair estimate of average consumption may be made, but in general the assessment of nutrition is bound to be based on consideration of the food—rationed and unrationed—that is said to be received.

In estimating the food received, enquiry should therefore first be made through official channels, a statement of the official rations being obtained from the local rationing body, military or civilian. Some indication of the existence of black market trading can sometimes be obtained from official sources also. Where possible, a statement of the rations through the whole period of food control and in any case over the past six to twelve months should be obtained. The back files of local newspapers are sometimes a source of this information. It is also worth remembering that there may be found to be available records of the local authority on the birth rate, death rate, maternal and infant mortality rates, incidence of tuberculosis, typhus and other infectious diseases; and in addition there may be records in the local schools of the measurements of children.

Survey of Consumers

The official enquiry should be followed up by questioning a sample of the consumers themselves, to collect information on the food and other essentials actually received by the population.

1. *Sampling*: this questioning should best be made of a random sample of the population by house-to-house visits, though if speed is important it is often convenient to collect information for a preliminary report by questioning women waiting in food queues—they have time to spare and food is the predominant interest of the moment. Tact and a good *rapport* are necessary, however, in questioning individuals in the presence of strangers, and enquiries on private matters such as rent, wages, housing, etc., should be made only on house-to-house visits. Whenever questioning is done, it is

important to collect information from every class of society and to cover every district in the area. There is naturally an inclination among relief workers to investigate the poorest and most necessitous cases; but any deliberate choice either in questioning as to rations and conditions or in the physical examination of individuals may give a completely inaccurate picture rendering the whole investigation statistically valueless.

It should be remembered, however, that the results obtained from surveys based on sampling are averages; thus, both in the enquiry about food and other supplies and also in the taking of weights and measurements, the average figures resulting may mask extremes on which light can only be cast by analysis of the individual investigations. One factor which may well influence the degree of need or of well-being of any family is its " social grade ", whether reflected in income or size of house or otherwise. Information on " social grade " may easily be related to the other and more factual information collected and thus be of use to the relief administration. Therefore a rough indication of " social grade " should be attempted, and households should be classified simply either as " rich ", " average " or " poor ", or as " high ", " average " or " low ", as seems best, even if the distinctions are partly subjective to the different investigators.

In order to get a " random sample " that will be statistically useful, it might be possible to obtain from the postal or town authorities a list of households from which every tenth or twentieth (according to the size of the town and the number it is intended to include in the sample) could be selected for visiting. The possible absence of such a list and the physical labour of interviewing at widely scattered addresses make it more desirable to take a random sample of streets and interview at every tenth house in them, going next door if the housewife is out or the house uninhabited. Providing every part of the town is covered it is often easiest, having made a random selection of streets, to take these streets and two or three more on each side of them, interviewing at every tenth or twentieth house; thus much walking and consequent exhaustion may be

avoided. Similarly, if it is desired to make a rapid survey of women in queues, every district of the town should be covered and women questioned according to the position they occupy in the queue—every tenth or twentieth, say—and not according to a deliberate choice of the apparently needy and ill-nourished. The accuracy of the results of an investigation carried through on samples depends upon the actual number in the sample and not upon the fraction that the number forms of the whole population; a smaller fraction can be taken therefore from large towns than from small ones; it is recommended that an attempt should be made to include about 500 households in any sample, though fewer would not be valueless.

2. *The information* collected in this enquiry should include an account of the actual amounts received in the week prior to the survey of bread and/or flour, meat, fish, milk (note if it is fresh, dried or condensed; full-cream or skimmed; how it is distributed and whether reserved for priority groups), sugar and preserves, fat, cooking oil, cereals (rice, macaroni, semolina, spaghetti, etc.), pulses, potatoes, vegetables and fruit, soya flour. Questions should be asked about what unrationed foods are available, what domestic resources the family has (garden vegetables, pigs, chickens, eggs, rabbits, goats, cows, etc.), what black market supplies can be obtained and whether any meals or additions to the diet are made for special people—such as milk or meals in schools, clinics or factories. The availability of restaurant and hotel meals is relevant, and it should be noted whether these are in addition to rations or whether ration coupons have to be surrendered for them. It is essential to visit bakers to discover the constituents of the bread supplied, and millers for information on the quality of the flour; but when time is short this can be done after a preliminary report has been made.

A statement of how long the present rations have been received and what major alterations have been made would be useful in giving an indication of which deficiencies in the diet are likely to be most urgent relative to the need of other areas under consideration by relief headquarters. It is important to know whether existing deficiencies fall upon a population

previously adequately fed or previously suffering from malnutrition and longstanding dietary deficiency.

At the same time as these enquiries are being made, information should be gained on wages and incomes, employment, clothing, soap, fuel (quantity in store and amount normally used at the season), cooking equipment, housing, rent and other commitments, noting recent changes and their relationship to price movements. The constitution of each family surveyed should be recorded.

A suggested form for reporting interviews is given in Appendix 3.

Collection of Anthropometric and Clinical Data

1. *Anthropometric measurements.* Some indication has been given so far of the information required, and the methods by which it may be acquired, to form an estimate of the general conditions of food and food supply in an area, and hence of the probable general nutritional state there. Examination of individuals provides further evidence and can be done by taking weights and measurements and certain clinical observations. Such examinations are useful if their results can be compared with any known standards for the locality and racial type, whether the standards are in the form of nutritional indices or of standard curves; but in any case, even if indices cannot be used and standard curves are unobtainable, the results of examination at the beginning of a relief scheme form a base-line when compared with the results of subsequent examinations for judging the progress of the scheme.

It is unlikely that a scheme for the weighing of adults could be carried out, except perhaps of selected groups in hospitals, asylums, etc., which would be useless for assessing the nutritional level of the general population. It is usually possible to arrange to weigh and measure groups of children of school age, either in schools or, if these are not open, in feeding centres. If neither of these services is operating, heights, weights and ages can be taken in house-to-house visits, though such details may well not be considered necessary for a first report on an area. Here again it is of the greatest importance

to take a random sample[1] of the child population. If schools or feeding centres are open, the children should be sampled by selecting every tenth child on the register. It may be found that a proportion of the children selected are not attending school; these absentees must be included on the list of selected children and should be weighed and measured at home; if every tenth child in the school class only were taken, the sample would cease to be " random " and might represent only those children who were well-nourished enough or had good enough clothing to come to school. The number of children measured should be at least 50 in each age-group (year). Much of this work should be done by schoolteachers or other local helpers, after a demonstration of the technique to be used.

The technique of these anthropometric examinations is bound to be determined in the light of the exact requirements of the relief administration, which may well lay down, as much for the convenience of future research as for uniformity between surveys, what measurements should be made. Much thought has been and is being given to the possibilities of using some index of nutrition produced by mathematical combination of physical measurements; many indices have been produced, for which readers are referred to Professor Bigwood's *Guiding Principles for Studies of the Nutrition of Populations* (League of Nations[2]); it seems that all these indices are at best empirical, and unless U.N.R.R.A. decides that some specific one should be used, the best an ordinary worker can do is to produce some simple figures that have been found useful. Each survey team should carry a measuring scale and weighing scales, the latter being calibrated at regular intervals. For weighing, children should be divested of outer clothes and weighed in vest, knickers and socks at a given time of day—say before the midday meal; weight should be ascertained to 0·1 kgm. The main measurements are the standing height, taken from the vertex of the head to the soles of the feet while standing with head erect, feet together

[1] See above, pp. 44, 45 and 46.
[2] Document C.H./Com. Exp. Alim. 50 (1).

and shoulders, buttocks and heels against the upright of the measure; and the sitting height, taken from the vertex of the head to the seat of the chair while sitting with head erect and shoulders and buttocks against the upright of the measure. Another useful measurement is the chest circumference, taken at nipple level at the end of expiration and in full inspiration. In all cases the age of the measured child must be noted.

2. *Clinical Observations.* So far as clinical estimations are concerned, it has already been pointed out that although *the diagnosis of deficiency disease must rest with medical men who have had considerable experience in that work*, many opportunities will arise for relief workers to make useful observations which may draw attention to conditions which might otherwise escape attention. In questioning individuals in schools, feeding centres or food queues, and in house-to-house enquiries impressions and observations can be recorded as such; for example, " mucous membranes look pale " rather than " child is anaemic ". The occurrence of certain signs suggestive of deficiency diseases can be noted, with particulars of age, sex and other relevant facts such as " abandoned child ", " refugee from . . . ", " relative of case X ", and so on.

The matters to be observed thus can be listed as follows,[1] though it should be remembered that the conditions listed as occurring in the various nutritional deficiencies are not in many cases specific for those deficiencies:

i. *General physical state*—is the subject able to work or to attend school (if an absentee, the reason should be given—weakness, lack of shoes, etc.); a note should be made of any known existing disease, such as tuberculosis, discharging ears.

ii. *Observer's impressions*—

(*a*) *colour*—a noticeable degree of pallor of mucous membranes inside lips, cheeks and eyelids should be recorded.

(*b*) *wasting*—is this more or less than apparent average of family or group ?

[1] See Chapter 3, " The Effects of Under-Nutrition ".

(*c*) *mental outlook*—apathetic or depressed; or bright, alert and responsive.

(*d*) *activity*—is the subject normal for age, or lethargic and listless ?

iii. *Condition of skin*—

(*a*) *roughness and "goose-skin"* on thighs, backs of arms, shoulders and abdomen is suggestive of hyperkeratinization which may occur in vitamin A deficiency; but the observer should look for "scratch marks" and enquire for itching and whether treatment has been given for any skin complaint such as scabies, and whether other members of the family are affected.

(*b*) *cracks, fissures and thickening of the skin* about lips and nostrils.

(*c*) *scaly patches*, dusky red patches, pigmentation and desquamation over areas of face, hands and legs, especially where exposed to light, suggest the dermatitis of pellagra.

(*d*) *haemorrhages* suggesting scurvy, both the minute blood spots (petechiae) and larger subcutaneous "bruising" should be noted.

iv. *Condition of the eyes*—

(*a*) *conjunctivitis*: dryness, wrinkling, loss of lustre, "foamy" areas, white patches, slight sticky discharge.

(*b*) *corneal opacities*, ulceration.

(*c*) *dislike of strong light* (photophobia).

(*d*) enquiry should be made for "*night blindness*", i.e. difficulty in seeing on passing from a light to a dark room.

v. *Condition of the mouth*—

(*a*) *lips*—soreness, redness, fissures.

(*b*) *tongue*—"beefy" redness and soreness suggests glossitis of pellagra; "cobblestone" appearance and deep purple-red colour with patchy denudation in riboflavin deficiency.

(*c*) *gums*—in scurvy, the gums around the tooth sockets are red, spongy and swollen, and bleed easily.

vi. *Oedema*—shows as a puffiness of feet, lower limbs, body and face; the swelling may be very slight, moderate, or generalized and severe; it " pits " on pressure with the fingers especially over the shin bones.

vii. *Skeletal deformities*—the early stages of rickets in infants cannot be detected by clinical examination alone; in the more advanced cases, the observer might be able to find bowing of the legs, enlargement of the ends of the long bones at the wrist, prominent breast bone with depressed ribs, a square head with prominent frontal and parietal " bossing ", and the general clinical state of flabby muscle and nervous irritability described in Chapter 3; but rickets is a disease of growing bone, and if the diet is so poor that growth is arrested then the characteristic changes of rickets do not appear even in the absence of vitamin D; the deformities of osteomalacia may be seen in adult women especially in pregnancy and during lactation.

viii. *Some general complaints* that may usefully be noted are:

(*a*) fatigue, breathlessness.

(*b*) pains in limbs, cramps, the intense pain of intramuscular and subperiosteal haemorrhages in scurvy, the gnawing pain and tenderness of bones in osteomalacia.

(*c*) true nervous paralysis, or muscular weakness.

(*d*) gastro-intestinal disturbances.

Regular scientific or chemical tests are of course beyond the scope of the ordinary survey. If hospital facilities are available it may be possible to arrange the more common investigations, such as X-rays of bones, haemoglobin or ascorbic acid estimations.

A suggested form for recording measurements and clinical observations is given in Appendix 3.

Personnel

It is clear that it would be impossible for the presumably few members of a survey or relief team to make a comprehensive report as outlined in a short time. Thus it is most

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necessary, quite apart from the psychological desirability of working with rather than for local people, to enlist as much help as possible from suitable people in the area surveyed. Teachers, welfare workers, university students and other educated persons can be easily instructed in the simple methods for measuring children described above. Their help may also be necessary if the investigating team has not command of the language and dialects of the districts, though there may be unwillingness to impart private information to neighbours, and relief workers coming from without may be free from the political tinges and suspicions that must be prevalent in modern Europe.

CHAPTER 5

EUROPEAN FOOD HABITS

No survey is of immediate application without comparative data. The purpose of this chapter is therefore twofold: to give a qualitative and (so far as possible) quantitative picture that the relief worker may compare with the picture he sees in the field so that he may know what is needed to bring back something akin to pre-war normality and so that he may not offend local tastes, customs and prejudices by methods of feeding inappropriate in those localities. There are many parts of Europe, particularly in the east, where even the comparatively adequate standard of nutrition common to the North Atlantic countries is not achieved; it must not be assumed that any emphasis on the desirability of knowledge about pre-war conditions is intended to condone the continuance of conditions below the optimum; but any material improvement in those parts is for a long term policy and is hardly the business of relief work, though it may properly be the concern of rehabilitation. The war has changed many habits, not always necessarily for the worse; and habits that have been continued for five years or more of wartime and post-war conditions may be considered more normal than those they replaced. For instance, the wartime increase in potato consumption (for energy purposes) has led to the institution of two cooked meals a day instead of one in some parts. The information in this chapter should be considered supplementary to the information in the League of Nations booklet *Rural Dietaries in Europe* (European Conference on Rural Life—26)[1].

Until recently, knowledge about what people eat was confined to impressions recorded by travellers, and like all individual experiences these could not be accepted as representative of diets in a whole social class, let alone in a whole country. Just before the war, the first attempts were made to

[1] Official No.: C.183. M.112, 1939. Conf. E.V.R. 25.

make scientific studies of food consumption on the basis of statistical evidence. There were two methods: one was by making house to house surveys, recording the actual food consumption of each family over a period of a week or fortnight and repeating the survey at, say, four different times of the year; the other was by determining how much food was available in a country and expressing that as so much per head of the population. For satisfactory results by the first method it was necessary to investigate several thousand families in any one country. The latter global method was reliable in the case of wholly imported products such as tea or coffee of which the amounts available were precisely known, but was unsatisfactory for home-produced foods such as potatoes which might be consumed either by human beings or by animals. Moreover, the national average consumption might be very different from the actual consumption in any one social group (whether divided financially or by occupation or geographically).

For many European countries figures of pre-war national average consumption are available; but few countries have undertaken the more difficult but more realistic family budget surveys on a large scale. Nevertheless, it is possible to distinguish three main types of dietary in continental Europe. The first is that in northern and western Europe, a mixed diet including fairly generous quantities of livestock products, the chief carbohydrate food being bread. Secondly, the central European diet also is a mixed one, though with less livestock produce, and in which the chief bulky foodstuff is not bread but potatoes. Thirdly, the diet of southern and south-eastern Europe, which cannot be called mixed and which consists almost entirely of cereals plus a few etceteras. To some small extent the differences between these diets are due to climatic conditions, but in the main they reflect different degrees of poverty and wealth.

Northern and Western Europe

1. *France.* Though in the southern districts French diet is akin to the Mediterranean type, in the main there is a varied

food consumption, with everywhere a high consumption of white bread, which before the war was baked of fine white wheat flour. Much meat is eaten (according to means), not very much fat (normally butter, though margarine is more common in towns) and comparatively little milk. The fame of French food derives from the food habits of the upper class and the restaurants; the poor, especially in the country, are said to have a nutritionally inadequate diet though generally made tasty with herbs—garlic especially in the south, vinegar and many sauces made from wines, spices even in pastry, thyme, bayleaves, cinnamon, ginger and herbs. Much use is made of beans, often as a course in themselves with white sauce at midday meal.

There are three meals a day—breakfast consisting of coffee with bread and butter or roll or bread dipped or soaked in coffee; dinner taken early (12 to 12.30) beginning almost invariably with soup or more occasionally with hors-d'oeuvre followed by meat with vegetables or salad and potatoes, and then either nothing or a light sweet or fruit or occasionally cheese; supper which is similar to dinner without the meat course. Puddings after the English fashion are almost unknown; soups are commonly sieved, but stews are rare; the meat consumed is mainly beef and pork because, though France eats more mutton and lamb than almost any other European country, it is still little compared with British consumption. Milky coffee is the staple drink for breakfast and supper; beer is drunk with the midday meal in the north and wine in Paris and farther south (parts of Normandy and Brittany are cider-drinking).

France has not yet produced any family budget studies, so nothing factual is known about the habits of different groups or regions. It is thought that the north eats more meat and fat than average, the east more potatoes, the west more fish and milk and the south more fruit and vegetables, cheese and oil. Factory canteens and meals in schools have become common during the war, but the usual restaurant was the small family business which was common and popular in small and large towns. Soup purée machines and sieves and often

vegetable cutting mills would be common kitchen equipment. Gas or electricity is usual in towns; coal or wood ranges in the country for cooking.

2. *Belgium.* In general the dietary is similar to that of France, for though Belgium is far more industrialized, the wide geographical scatter of industry and the interpenetration of town and country have enabled rural habits to be kept by many factory workers—for example bread baking in the home is not uncommon. The Belgians eat more fat and sugar than the French but consume less milk. They drink little wine, but the average consumption of beer is about 1½ pints a day—of low alcoholic content even in peacetime. There is a large consumption of bread and potatoes (by western European standards), the latter being taken twice a day at least, usually chipped and fried in deep fat.

The arrangements of meals is as in France, though cheese may be eaten at breakfast and a 10 a.m. second breakfast of coffee with bread and butter is often taken. The middle and upper classes eat a cooked midday meal and frequently a light afternoon meal of coffee and bread and butter; but working people tend to take sandwiches (thick) and a bottle of coffee to work for midday meal and eat their supper earlier with no meal between. It appears usual to eat cold meat and potatoes for supper rather than a sweet as in France. The common soup and vegetables are as in Britain, though with less emphasis on cabbage. A thin porridge of oats is made by farming people, and cornflour moulds and semolina puddings are popular sweets.

Communal feeding has become common since the German occupation. Deep fat fryers are common kitchen equipment, and though gas has become more usual as a fuel in recent years, coal ranges are still more normal.

3. *Netherlands.* This is a much richer country with real incomes nearly 50 per cent. higher than in France and Belgium and a much better diet; there is a lower consumption of bread and potatoes and a higher consumption of milk, fats, sugar and fruit and vegetables other than potatoes (see Table III). The Dutch, like the Belgians, rely to a large extent on imports

and are big consumers of margarine (made from imported oil seeds) and fairly large consumers of rice and citrus fruit. The most common bread is a wholemeal wheat or heavy rye loaf, though white bread is usual in the richer western districts. Soup is not eaten every day as it is in France and Belgium, but stews containing meat and vegetables are eaten, especially in winter. More veal is eaten than in Britain, and no lamb or mutton; habits so far as vegetables are concerned are similar to the Belgian ones. The main beverage is coffee for the poorer people and weak tea for the others. Oatmeal in the form of porridge is popular in the country.

The usual three meals are taken each day, though they are often one-course meals in the lower income groups, and breakfast often includes eggs or cheese in addition to bread and butter. The midday meal is similar to the British one, though it is common for labourers and factory workers to take it in the form of sandwiches and for office workers to eat out in cafés. Supper is generally a meal of cold meat or cheese, bread and butter and tea. Fish is an important protein food in the Dutch diet.

It appears from other studies that the calorie value of the diet among workers is surprisingly low, as is also the national average. Gas is the common fuel in the towns, and in the country coal or oil or sometimes peat or wood is used.

4. *Denmark.* The Danes have the best diet of any people in occupied Europe, and their pre-war diet was particularly good also. Their meat consumption is high, they eat substantial quantities of fish, sugar, fats (mainly margarine) and other imported goods. Meat, mostly pork, beef or (in the spring) veal or fish is eaten every day. Their bread is mainly rye bread, though wheat bread is also eaten. It is said to be customary not to eat cod in " months with an R ", and a popular way of serving meat or fish is to mince it when raw, mix with flour and milk and fry as a rissole. Soups are not common and are made from meat stock with added vegetables; vegetables are eaten in much the same way as in England, potatoes considerably, but roots such as swedes, turnips and parsnips are regarded as fodder and are not fed to human

beings. The main beverages are coffee (served without milk, either black or with cream), beer of the lager type, and fresh milk which are widely drunk by all classes. A common dish is a form of fruit stew consisting of rice, barley or other cereal cooked in water with fruit and sugar added. A peculiar form of porridge for children is made of rye bread soaked overnight and then cooked in a non-alcoholic stout.

Another common way of serving almost anything solid is in the form of smorgasbord—bread and butter supporting a variety of meats, fishes, eggs or salads (" sandwiches without their lids "). Flavourings are similar to the British, but there is a tendency to put cinnamon in soups and in things that we should consider savoury.

The usual three meals a day are taken, but there is a good deal of variety in their form. In some cases breakfast and supper take the form of smorgasbord, with the midday meal a normal cooked dinner; in other cases breakfast consists of oatmeal porridge and bread and butter and marmalade or jam, and supper is composed of the left-overs from the dinner with maybe fried potatoes and eggs added, and followed by bread and butter and cheese; cold herrings are popular for supper. The pattern for dinner is as follows: first a fruit stew or rice or cereal cooked in milk; then a main course of meat or fish with vegetables followed by bread and cheese or fruit if fruit has not been served for the first course. Few meals are eaten away from home, but it is customary for farm workers to take sandwiches for their midday meal, especially at harvest time.

As most meat is eaten minced, a mincer is common household equipment; coffee is made by percolation through a linen bag inside the coffee pot. The usual fuel for cooking in towns is gas, sometimes electricity; in rural districts kitchen ranges are found fired by wood or peat.

3. *Norway*. The diet is broadly similar to that of Denmark except that there is a high consumption of fish instead of meat. Fish is indeed a staple food of the poorer classes throughout the coastal districts, whereas the farmers of the inland villages, who because of transport difficulties cannot easily get fish, rely more on meat and cheese; the brown goats' milk cheese is a

Norwegian speciality, and " ryvita " and other fancy breads are common. Soups are made in great variety, based on meat, fish, vegetables or fruit; fruit also is used extensively in " sweet " dishes, of which apple porridge is said to be popular. In northern Norway, because of the latitude, hardly any foodstuffs can be grown except potatoes; scurvy occasionally appears. Norwegian food is much more salted than British, but salt is never put on the table.

The arrangement of meals varies according to work and season, particularly in agricultural areas where work starts at 5 a.m. in summer. Breakfast is generally akin to the British one, but the midday meal is usually a " sit-at-desk " snack for town workers, who take their main meal later between 3 and 5 p.m. when work has finished. The rural population is about a third of the total, and in the country it is more common to eat a main meal at midday and a high tea or supper after the Danish habit.

6. *Finland.* Finland is the poorest of the Scandinavian countries and also the least industrialized. This is reflected in the diet. Consumption of both bread (mostly eaten as " hard-bread "—like rusks) and potatoes is high; but partly because the farming population is large there is a very high milk consumption. The milk habit indeed is universal, glasses of milk being drunk with most restaurant meals in the cities and in quite poor households. Fat consumption is low for a northern and cold country where people are supposed to need more fat. Fruit and vegetables are always short. Most of the larger towns have cheap popular restaurants, similar to our British Restaurants, at which industrial workers take their midday meals.

Central European Countries

1. *Germany.* This is the westernmost country in which potatoes are more important than bread as the staple starch food. Nevertheless the average consumption of meat, milk and fats is of a western standard. Half the average food expenditure was spent on animal produce, equally divided between meat and meat products on the one hand and dairy

produce on the other. Half the expenditure on plant produce was spent on bread, cereal products and potatoes, and the other half on vegetables, fruit, sugar and vegetable fats. People in the lower income groups eat meat two or three times a week, well-to-do people daily, the most common meat being pork, very fat pork judged by English standards—with beef in the south next common. Eggs throughout the country and cheese in the south, centre and west are also important protein foods. Soup is a staple food with the working classes, particularly thick soups made with peas, lentils, beans (in the north), potatoes, cereals and meat and bacon scraps; a soup of this kind is frequently the whole of the one-course meal (Eintopfgericht) of the workers; sweets or "afters" are customary in better-class households particularly in the form of stewed fruit; sweets called "pudding" are not uncommon made of blanc-mange-like mixtures. Coffee is the standard beverage in the home, afternoon coffee being common everywhere; even the poorest people bought some coffee, if only a quarter or one-eighth of a pound; a mixture of real and malt coffee is much used; the import tax on coffee was in 1938 50 Pf. a lb., while that on tea was 4.50 M. a lb.—tea thus being far too expensive for most people. Wine is commonly drunk in the Rhineland and the Moselle area (where there is also a cider known as "Viz"), and beer elsewhere, though Schnapps is popular in the north even among the peasants who take it as their drink with their bread and butter with cheese or sausage snack in the fields. In south Germany cider is known as "Most".

Regional differences of food consumption were even greater than the occupational, particularly with regard to fish, of which ten times as much was consumed before the war in the coastal regions as in southern Germany (national average 12 kilos per head per year). The food habits of western Germany all down the Rhine are akin to those of France, whereas in the east they approximate to the Polish dietary—that is to say consumption of potatoes and pig meat is particularly high in the east, while Baden and Württemburg were notable for their high consumption of fruit and fruit wines and preserves. Vegetable

consumption was high in the west also, in the east variety being poorer with cabbage, beetroot and carrots the staples, and the west and south-west were the areas of largest meat consumption, hot meals being preferred to sausages of the breakfast type which are appreciated in the north. Bread and fat consumption was correspondingly higher in the north, the south Germans compensating for their low consumption of fats by eating more eggs, milk and sugar. Bread is only home-baked in remote country districts and farmsteads, the dark rye bread being prominent in central and north Germany, though white bread is eaten occasionally in the south; a variety of the favourite black bread containing a little treacle is a delicacy (Pumpernickel). As in Denmark and Czechoslovakia most bread is neither pure wheat nor pure rye, being baked from a mixture of the two, the composition of the mixture varying, especially in wartime according to supplies. At present, the Germans do have some pure, or almost pure, rye bread which they get with special coupons marked " R " on their bread cards.

There are commonly two main meals, a midday dinner at 12 to 1 p.m. and a supper around 7 p.m. The day starts with a first breakfast of coffee and rolls, followed by second breakfast during a break from work at 10 or 11 a.m. when sandwiches are eaten with coffee or beer. Except among the working classes, the midday meal consists of soup and a second course of potatoes with either meat or salad or vegetables. In Bavaria the main dish is often a sweet cereal dish (Mehlspeise) or a yeast cake with fruit, and dumplings of stale bread and milk are sometimes used instead of potatoes. In Thuringia raw potato dumplings are a speciality. Some people take afternoon coffee with rolls or cake, and the evening meal is usually cold, consisting of bread, sausages, cheese, kippers, etc. Sometimes this cold meal is taken at midday, the cooked meal being transferred to the evening. This was particularly so in the case of factory workers before canteens were common.

For fuel, coal, coke, gas and wood are common. In the north, peat is used; in Rhineland and central Germany briquettes made of brown coal make an excellent heating

material. In central Germany, " Grudekoks " (i.e. soft, fine, brown coal) is used in specially constructed " Grudeöfen " for keeping things hot and for slow simmering. For cutting up vegetables, a double-bladed circular knife (Wiegemesser) is often used.

2. *Poland.* The low standard of living of the Polish people is shown in their diet which consists in the main of vegetables, potatoes and rye bread. There are sharp differences not only between the diet of the workers and that of the middle and upper classes but also between townsfolk and country people (also due to income differences). The staple protein foods are white curd cheese and imported herrings which are pickled. Soup also is important in both town and country; it is based either on a vegetable-like beetroot (barszcz), or cabbage (kapusniak) and mushroom and barley (krupnik), or dried peas (grochowka), potatoes (zupa kartoflana) or on meat and bones; in the summer barszcz and fruit soups are eaten cold. The average meat consumption is low, two-thirds of it pork, and it appears that most of the meat, sugar and fats are consumed by the higher income groups. Many Polish dishes are a mixture of meat and vegetables—meat and cabbage (bigos), meat and noodle paste (pirogi). Rye and barley are the main cereals, maize being used somewhat in the south-eastern provinces.

Meals in the towns are the usual three a day, many office workers working through to 4 p.m. and taking their main meal then, often in a restaurant or café. Workers usually eat their main meal at home or have it brought to them at their work, put in a basket by their wives. In the country meals are commonly carried to work in the fields. For flavourings, caraway seed is widely used with meat, vegetables and bread; dill is used like parsley in England, and other common herbs are marjoram, thyme, bayleaves, chives. Coal, gas and electricity are all used for cooking; in the eastern provinces and country districts mostly wood.

3. *Czechoslovakia.* This republic has widely different diets in its various provinces. In Bohemia the diet resembles the German, in Slovakia it is more the Hungarian type, whilst

in Sub-Carpathian Ruthenia the diet is Polish in character. Sugar consumption is high, because the country produces a large surplus for export and (despite being taxed) it is cheap.

The average middle-class Bohemian town dweller has the usual small first breakfast, often takes soup and sausage for his second breakfast, and at midday eats his main hot meal consisting of soup, meat and two vegetables (for instance pork with sauerkraut and dumplings), and cake, pastry or fruit dumpling to finish with, drinking beer with it. Some people take afternoon tea, and supper is a cold meal as in Germany. Poorer people rely a great deal on potato dumplings and take meat only in the form of the ubiquitous sausage or smoked paste. In the winter more meat and fat tends to be eaten (e.g. pork and goose), and in the summer fruit dumplings replace meat. Among the country folk, the familiar peasant habit is followed of keeping one or two pigs for killing in the autumn or winter, little meat being eaten at other seasons. Pork is always roast, beef usually braised, and very little mutton eaten. Curd cheese is popular. Bread is rye bread baked at home in the country, and often wheat bread in the towns. Soup of all kinds is made, both clear and household or peasant soups; peas are more common in the west, beans in the east where green paprika is also common. Edible fungi from pine forests are much used and a good variety of vegetables is grown in Bohemia, though roots are little used. In Slovakia and Sub-Carpathian Ruthenia large quantities of pig fat are used for cooking and eating in the form of fatbacks —a kind of bacon which is almost solid fat; the farther east one goes the more do potato dumplings form the staple dish. Common flavourings are paprika pepper, nutmeg, cinnamon, caraway seeds, onion and (in the east) garlic. Beer is the standard beverage in Bohemia, and a white wine in the eastern provinces.

Mincing machines are common equipment, and a coffee grinder would be found in every home. In towns, coal ranges are usual though gas is known; in the villages, wood is most used in the fires except where coal is near at hand as in the Sudeten districts.

4. *Austria.* In Austria, different habits prevail from those in Germany. A particular feature is the high consumption of dishes made with flour—dumplings, strudel, pancakes, puddings of a semolina type, etc. Fruit also is available for a long season, there being normally substantial imports from southern Italy. Thus the average consumption of flour, meat, milk and fruit was considerably higher in Austria than in Germany, while the consumption of potatoes was less than a half:

	Kilos per head per year.	
	Germany.	*Austria.*
Bread grain	144	165
Meat	44	50
Milk	112	200
Fruit	50	55
Potatoes	176	85

Nevertheless, the Austrian diet varies substantially between the mountain districts and the towns. In the former milk and dairy produce play a large part in the diet, whilst in the towns less is eaten than in Germany.

Though, however, the food consumption in Austria as a whole differs from that of Germany taken as a whole, yet the Austrian diet is very much akin to the south German. In the eastern provinces there is some Hungarian influence—gulyash for instance being popular.

South and South-Eastern Europe

1. *Italy.* In Italy, two-thirds of the calorie intake is provided by cereals, mainly wheat, though some maize is eaten, particularly in the north where it is chiefly grown. The rye bread so common in central Europe is entirely absent. In the north rice is also an important foodstuff, grown in Lombardy and Piedmont. Consumption of meat, milk and dairy produce is extremely low, the main addition to bread and spaghetti being fruit and vegetables in various forms. A little beer is drunk in the north, but wine is the staple beverage everywhere else. Consumption of real coffee has been

deliberately restricted in recent years. Family budget evidence is extremely scanty and unreliable. It is known, however, that food habits differ widely from north to south, the north being a prosperous region in which the workers earn comparatively good wages and have a varied diet including meat, butter, cheese, sugar and eggs in reasonable quantities. The farther south one goes the poorer the people and the more inadequate the diet, till in Calabria and Sicily they rely almost entirely on cereals plus olive oil and vegetables. In many districts no liquid milk is consumed and young babies change over straight from human milk to a cup of wine.

2. *Yugoslavia.* This country is even poorer than Italy, and the people rely even more completely on cereals for their food. Consumption of maize is higher than of wheat and pellagra sometimes occurs. There are striking contrasts between the diet of the different regions. In the richest district north of Belgrade along the Hungarian frontier the peasants are prosperous, produce large food surpluses and have quite a good diet. In northern Croatia, though less prosperous, the people are engaged in dairying and consume adequate amounts of potatoes, milk and cheese; on the other hand southern Croatia and southern Serbia and the whole of the Dalmatia and Montenegro districts are deficiency areas which, even in peacetime, have to import their grain from the northern provinces, and which grow very little other food. In these districts, the population suffers acute undernourishment each year in the last month or two before the harvest. The diet consists of bread, beans, bacon soup containing very little bacon, plus cucumbers and onions when in season.

3. *Hungary.* This is the most prosperous of the south-eastern countries and in some respects the diet resembles more closely that of central Europe. There is a fairly high potato consumption but nevertheless grain consumption is also high. Meat and eggs are widely consumed, the former particularly in the towns. Fat is almost exclusively pig fat. Wide differences between urban and rural food habits made it difficult to introduce wartime rationing. For example, a ration of sugar which for the towns may represent a cut of

50 per cent. meant for the rural population an allocation several times larger than they had ever had before, and the net effect was to increase rather than reduce the national consumption. This was later overcome in Hungary and other south-eastern countries by differential rationing between town and country.

The typical Hungarian flour is white and fine, typical Hungarian dishes include gulyash and maize eaten " on the cob "—known as " Kukuluz ". There are known to be considerable differences in the diet according to income groups, the poor peasants being in a state similar to that of the poor Poles; but details of these differences are lacking.

4. *Roumania.* The diet in this country is among the worst in Europe. A little bread made of a wheat-maize mixture is eaten, but the staple foodstuff is a kind of polenta or mamilaga—a kind of porridge made of maize meal—which is consumed to the extent of 2-3 kg. a day. Sugar and potato consumption is low and dairy produce is only available in the hilly districts of Transylvania. The population relies on vegetables in season, mainly peas and beans, eaten in the form of soups and stews to which occasionally small quantities of pork or bacon are added. No potatoes are used. Such cheese as exists is made from goats' milk, and the normal cooking fat is lard or vegetable oil. There is very little fruit.

Peasants rise early and have for breakfast polenta with sometimes goats' milk and raw vegetable such as onion. At midday a vegetable stew and polenta is eaten, and in the evening (about 6 p.m.) supper is a snack of left-overs, with occasionally goat cheese. Some peasants keep a pig for killing in December. Wood is the main fuel.

In Roumania as in other Greek Orthodox countries there are over 170 fasting days in the year, when no meat, milk, eggs or other animal produce are eaten. These fasts divide as follows:

Christmas	..	1st to 24th December
Lent ..	..	19th February to 20th March
St. Peter's	..	4th to 21st June

5. *Bulgaria.* In this country the standard of living is normally slightly superior to that of Roumania or Yugoslavia, and although cereal consumption is high there is a wider range of fruit and vegetables available. In the mountainous districts sheep's milk both for drinking and made into cheese is important. Pigs are much less widely kept than in the neighbouring countries, and olive oil is more important than pig fat as a source of fats.

6. *Greece.* Unlike the other south-eastern countries, no grain is exported from Greece; on the contrary all the wheat, sugar and many miscellaneous foodstuffs are imported. In towns, wheat bread baked at bakeries is the staple, but in rural communities wheat flour is often mixed with barley, rye and maize and baked at home (or prepared at home and baked in common bakeries). Cereals are ground in hand-mills. In the poorer areas such as Epirus, West Macedonia and the highlands of Thessaly the maize content is higher. The consumption of milk is very low everywhere, though in the country it is not unusual to drink goats' or ewes' milk fresh; cows are unimportant. Consumption of olive oil, fruit (particularly grapes) and vegetables is high, particularly in the south where the pulses—peas, split beans, broad beans and lentils—are much used. In the north chick peas and beans are added to a diet of which cereals form a more important part. Rice is also known in the north. The pulses are usually made up into soup, and onion, garlic, tomato, oil and pepper are used as ingredients. The meat consumption is low everywhere, wealthier peasants (10 per cent. of the population) eating it once or twice a week (goat, mutton or beef but seldom pork) and the bulk of the peasantry not being able to afford it more than four or five times a year. Middle-class and working-class people who form the bulk of the population in urban centres eat meat no more than once a week, usually taking it stewed with vegetables or pulses (tomato and onion always being basic ingredients) in olive oil. It is often minced, mixed with rice and macaroni and stuffed into paste or vegetables (marrow, egg plants, vine leaves). Minced meat is also made into keftedes (a kind of rissole) or served with

macaroni and rice and a tomato sauce; but only a small part of the population can afford such meals. Babies are often weaned after 9-10 months, but peasants and shepherds often wean them later, sometimes as late as 18 months to 2 years—to the detriment of the mother's health. Weaned babies are seldom fed on anything but ordinary food, so far as they can take it; but the present Red Cross relief scheme does provide a little condensed and powdered milk, semolina and cacao for young children.

All peasants start work before sunrise. Most of them eat or drink nothing at that time. Work is interrupted for about half an hour between 9 and 10 a.m. when they have a light "casse-croute" which consists of a large chunk of bread, onion, sometimes olives, and a little bit of cheese, and fruit and vegetables in the summer. They eat much the same at 12-1 o'clock but have a hot meal in the evening (6-7 o'clock) consisting of a soup (pulses, tomato soup, wild herbs, etc.) or pnigouri and polenta.

Workers in towns and small middle-class craftsmen, artisans and small shopkeepers take meals at times similar to those of the peasants. But in the large towns they may vary their diet by eating at lunchtime a hard-boiled egg, a dried herring or a cold dish (vegetables, rice, etc.) prepared at home, and in the evening by eating sometimes rice, macaroni, a soup with pastes, etc.

Office workers usually drink a cup of milk or have a Turkish coffee with a hard biscuit (gallette) at breakfast time. If they are married most of them lunch at home (1-2 p.m.), while the unmarried ones lunch at restaurants. Those who are better off have a substantial lunch consisting of soup, followed by a main course (ragout, fish, etc.), a sweet, cheese and fruit. Those belonging to the lower income groups usually have only a soup and a main course. The menu and number of courses for supper (8-9 p.m.), the main meal of the wealthiest classes, are much the same.

The first three groups, especially in the south, drink wine with their meals, the wealthier townspeople also drink beer.

TABLE III

APPROXIMATE ESTIMATED CONSUMPTION OF MAIN FOODSTUFFS

(Kg. per head of population per year)

All figures relate to pre-war frontiers

	GERMANY.			AUSTRIA.			CZECHOSLOVAKIA			POLAND.			GREECE.			ITALY.		YUGOSLAVIA.			BULGARIA.		
	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.
Grain																							
Wheat and Rye ..	144	105	140	165	105	140	147	130	125	130	120	143	150	66	71	158	140	115	95	109	215	155	210
Maize	—	—	—	—	—	—	—	—	—	—	—	—	15	25	27	30	30	170	145	103	70	90	60
Other Grains ..	1·0	26	11	1·0	26	11	1·6	13[2]	13[2]	7	6	—	5	—	—	1·0	—	—	—	—	—	—	—
Rice (milled) ..	2·0	—	—	2·0	—	—	3·8	—	—	1·2	—	—	5	—	—	8	8	1·2	—	—	—	—	—
Potatoes	176	275	175	85	275	175	150	200	173	300	300	300	15	9	7·1	41	49	59	64	61	13	40	37
Sugar (refined) ..	24	24	23	24	24	23	24	24	26·6	11	9·5	12	10	1·6	1·7	7·6	8·8	4·7	6·7	3·0	3·2	5·5	6
Meat	44	32	31	50	32	31	27·8	22·5	21·3	21·2	14·4	13·6	20·6	7·1	7·1	16·4	13·8	16·5	15·3	11	20·2	18	18
Milk (liquid whole) ..	112	65	65	200	65	65	133	80	74	107	70	67	36	18·4	18·4	65	47	74	62	50	48	45	42
Butter	9	8	8	3	8	8	5·3	5·2	4·3	4·7	3	3	0·7	0·4	0·4	1·0	0·9	2	1·3	1·2	1·0	1·0	0·7
Oil (pure)	9	3	3	3	3	3	5·0	3·0	2·3	1·0	—	1·0	15	11·7	10·7	6·5	5·3	0·4	1·2	2·4	4·5	5·3	5·2
Pig-fat (crude)[1] ..	8	4	4	10	4	4	5·3	2·7	2·7	3·1	2·3	2·3	0·7	0·4	0·4	3·5	2·0	3·6	5·0	3·0	2·4	2·2	2·2
Eggs (number) ..	122	75	70	110	75	70	136	90	80	70	50	48	80	24	24	130	100	66	60	60	75	91	90
Fish	12	8	8	1	1	1	1·5	—	—	1·5	1·0	—	5	1·0	0·5	6·5	3	0·3	0·3	0·3	0·6	0·6	0·6
Cheese (full cream) ..	5	3	3	4	3	3	2·7	1·0	1·0	—	—	—	8	4·3	4·3	4·7	4	1·0	1·0	1·0	0·7	0·5	0·5
Wine	6·5	6	6	19	17	17	4	3	3	—	—	—	47	30	30	85	70	28	25	25	27	20	20
Calories daily (including calories from foodstuffs not shown above)	2750	2550	2500	2700	2550	2500	2450	2300	2300	2250	2000	2200	2250	1300	1400	2250	2150	2700	2300	2150	2750	2400	2750

[1] Crude pig-fat contains 80 per cent. pure fat or lard.

[2] Including potato flour.

TABLE III —*continued*

APPROXIMATE ESTIMATED CONSUMPTION OF MAIN FOODSTUFFS

(Kg. per head of population per year)

All figures relate to pre-war frontiers

	Rumania.			Hungary.			France.			Belgium.			Netherlands.			Denmark.			Norway.			Finland.		
	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.	Pre-war.	1942/43.	1943/44.
Grain																								
Wheat and Rye ..	104	86	128	160	153	160	160	100	117	165	90	102	114	82	83	107	85	118	120	75	77	157	141	141
Maize	166	143	128	90	80	54	2·4	—	—	—	—	—	—	—	—	—	—	—	1·7	—	—	1·3	—	—
Other Grains ..	—	—	—	—	—	—	4·1	5·0[2]	—	0·3	4	6	1·4	20[2]	17[2]	9·1	46	13	7·4	25	23	4·6	—	—
Rice (milled) ..	1·1	—	—	1·7	—	—	1·7	—	—	3·4	—	—	5·2	—	—	2·0	—	—	1·6	—	—	2·7	—	—
Potatoes	50	43	67	100	87	107	167	175	168	168	180	193	117	250	200	112	128	154	105	167	185	182	150	154
Sugar (refined) ..	5	6·2	7	11	10	11	22	15·4	14	28	23	25	34	20	19	53	37	39	35	17	17	29	14·3	14
Meat	16·8	15	15	33·6	25·7	30	47·7	30	21·2	44	20·6	18	45·5	18·9	14	57·4	44·4	50	35·5	14·5	14	39·4	18·9	20
Milk (liquid whole) ..	70	70	68	86	85	82	103	71	74	78	50	45	140	57	67	173	162	179	155	125	133	261	150	150
Butter	1·0	1·0	1·0	1·6	1·5	1·2	4·8	3·8	3·5	8·2	5·3	5·5	5·5	8	7·2	8·5	18	19	8·6	6·7	5·3	9·7	8	8
Oil (pure)	1·5	3·1	3·6	1·0	1·0	1·3	6·3	0·3	0·8	7·7	1·2	1·1	10·0	neg.	3	16	neg.	1·3	14·2	6·6	8·3	2·2	neg.	0·3
Pig-fat (crude)[1] ..	4·2	4·0	3·8	13·9	13	12	1·9	1·5	1·5	2·6	0·8	0·7	4·6	1·0	1·0	0·8	1·7	2	3·1	1·0	1·0	2·6	1·0	1·3
Eggs (number) ..	85	77	73	150	130	130	154	70	70	163	30	30	93	25	20	115	110	108	121	45	43	48	30	30
Fish	1·2	1·6	1·6	neg.	neg.	neg.	9·1	5	2	9	7	5	12·7	8	6	15	10	15	30	30	40	5·5	4	4
Cheese (full cream) ..	1·0	1·0	1·0	0·4	0·3	0·3	5·4	2·9	2·5	3·3	neg.	neg.	7·6	5	4·4	5·9	3·8	7	6·1	3	2	1·0	1·0	1·0
Wine	49	40	23	36	34	34	180	73	77	4	neg.	neg.	neg.	neg.	neg.	neg.	neg.	neg.	2	neg.	neg.	neg.	neg.	neg.
Calories daily (including calories from foodstuffs not shown above)	2600	2250	2600	2750	2650	2750	2850	2000	2050	2800	1750	1900	2550	1950	1900	3050	2750	3050	2700	2050	2100	2850	2200	2250

[1] Crude pig-fat contains 80 per cent. pure fat or lard.

[2] Including potato flour.

Chapter 6

CLASSIFICATION AND COMPOSITION OF FOODS AND ASSESSMENT OF THEIR NUTRITIVE VALUE

A. Classification of Foods

The following classification that has been found useful in practice is widely used in the U.S.A. and Canada.

Food Group.	Primary Nutritional Function.	Subsidiary Nutritional Function.
1. Meats, Fish and Poultry	Source of "animal" protein	Source of nicotinic acid and vitamin B_1
2. Eggs	Source of "animal" protein	Source of vitamin A, vitamin D, riboflavin and iron
3. Milk and milk products (excluding butter)	Source of "animal" protein, calcium, vitamin A and riboflavin	———
4. Fats	Source of calories	Source of vitamins A and D in butter and vitaminized margarine
5. Sugar, jams, etc.	Source of calories	———
6. Grain products	Source of calories and proteins	Source of B vitamins in "long-extraction" flours
7. Dried pulses: peas, beans, etc.	Source of calories and proteins	Source of B vitamins
8. Leafy, green and yellow vegetables	Source of vitamin A	Source of vitamin C, iron and calcium
9. Tomatoes and citrus fruits	Source of vitamin C	Source of vitamin A
10. Potatoes	Source of calories and vitamin C	———
11. Other vegetables	———	Source of vitamin C
12. Other fruits	———	Source of vitamin C
13. Beverages: tea, cocoa, coffee, beer and wine	———	Some contribute to calories, riboflavin and nicotinic acid

This classification is also used in classifying the foods of which the compositions are given in Table IV. But foods show such a wide variety of composition that classification on a nutritional basis is not a simple matter.

B. Nutritive Value

As has already been made clear, foods are composed of a variety of nutrients. Table IV gives estimates of the amount of the different nutrients in each food.

In practically every case, a single value is given for each nutrient instead of a range of values. It is well known that the chemical composition of any foodstuff may show quite wide variations in samples from different parts of the world and in different seasons, especially in the case of the vitamin and mineral content. As a result, the figures given in the table may well vary somewhat from those obtained by analysis of a foodstuff in any particular area or season. At the same time, it is considered that the insertion of only a single value for each nutrient renders the table more generally useful than the inclusion of a range of values.

Thus, for example, different joints of beef have protein contents ranging from 13 per cent. to 19 per cent. of protein, and fat contents from 10 per cent. to 38 per cent. Except when estimating nutrient content of individual diets or when making dietary surveys of relatively small groups of people, these differences cannot be taken into account. A set of figures for " beef " is required.

The most marked loss in the nutritive value of foodstuffs in cooking occurs among the vitamins. Cooking losses also occur for nutrients other than vitamins, but they are much less than in the case of the vitamins and vary so much with cooking methods, etc., that it is impossible to lay down figures to represent these losses.

In the case of the vitamins, the extent of the loss also varies with the cooking method employed, the volume of cooking water in relation to the foodstuff, the time of cooking, etc.

The following arbitrary figures represent the average percentage loss over the usual range of cooking methods:

Fat-soluble vitamins ..	No appreciable loss
Vitamin B_1	35%
Riboflavin	20%
Nicotinic acid	25%
Ascorbic acid	65%

Notes on Individual Foods. References are to Table IV.

(*a*) *Bread and Flour* (wheaten)

The proportion of branny fibre in wheaten flour rises sharply when extraction is increased beyond 80 per cent. The greater the proportion of bran, the lower is the digestibility of the flour or bread. The following table indicates the relationship:

Extraction of wheaten flour	*Fibre*	*Bran*	*Digestibility*
%	%	%	%
75	0·10	—	97
85	0·55	3·9	94
90	1·0	7·1	91·5
95	1·5	10·7	88·7
100	1·95	13·9	86·3

At extraction levels higher than 80 per cent. the quantity of phytic acid in the bran may be sufficient to interfere with absorption of calcium in the diet (see pp. 11, 24, 40). It is advisable to add a salt of calcium to the flour to counteract this effect. A flour of 85 per cent. needs the addition of about 0·16 per cent. of calcium carbonate; one of 92 per cent. extraction would probably require as much as 0·32 per cent.

Bread quality deteriorates with increased fibre as extraction rises. It is also adversely affected by dilution of wheat with other cereal grains such as barley. Barley in proportions higher than 5 per cent. lowers the quality of bread.

The following notes about cereals and bread now eaten (1944) in different countries may be of use:

Country.	Cereals.	% Extraction.
Belgium	Little wheat	85
	Chiefly rye	80
	Some barley	
Czechoslovakia	Little wheat	Probably about 85
	Chiefly rye	Probably about 80
	Barley 10% in bread	
	Some maize	
Denmark	Wheat	85
	Rye	80–85
	Barley	90
France	Wheat	85
	Rye	85–90
Greece	Some wheat	90–92
	Some wheat	72–75
	Some wheat eaten whole in rural areas	
	Rye, barley and maize, home grown and lightly milled	
Netherlands	All cereals	85
Norway	Rye	90
	Oats	Lightly milled
	Barley	Lightly milled
	No wheat in bread	
Poland	Wheat	85
	Rye	85
Yugoslavia	Wheat	85
	Rye	90–95
	Maize	95

(b) Milk and Cheese

The following topical notes on milk and cheese in the different countries may be of use:

COUNTRY.	MILK.	CHEESE.
Belgium	Standardized to 2·5% fat	Much of cheese soft variety made from skimmed milk
Czechoslovakia	Milk now standardized to 2·5% fat	Much soft skim milk cheese
Denmark	———	Some whole milk cheese, 20% fat, some half-cream cheese about 10% fat
France	———	Many local varieties of cheese
Greece	Mainly sheep and goats' milk	Soft cheese from sheep and goats' milk
Netherlands	Milk standardized to 2·5% fat	As for Denmark
Norway	———	Several special varieties cheese, whey cheese much used
Poland	———	Both soft skim milk cheese and hard whole milk cheese

(*c*) *Meats and Poultry*

The following topical notes may be useful:

Country.	Beef.	Veal.	Pigs.	Mutton.	Lamb.
Belgium	Very lean dairy cows	Killed lean at 3 to 4 months	Lean at 8 months old	Little	Little
Czechoslovakia	Very lean dairy cows	Little	Lean at 60-80 kg.	Very little	Very little
Denmark	Very lean dairy cows	Some at birth, some 2-4 months, fat	Fat 120-150 kg.	Little	Little
France	Very lean dairy cows	Lean and young	Pre-war fat 150-180 kg.	—	—
Greece	Very lean dairy cows	Lean and young	Lean	Lean	Lean
Netherlands	Very lean dairy cows	80 kg. lean	Lean 60 kg.	Lean 25 kg.	—
Norway	Very lean dairy cows	Lean and young	Fat bacon type	—	—
Poland	Very lean dairy cows	Lean 25-50 kg.	Fat 100 kg.	Lean	—
Yugoslavia	Very lean dairy cows	Lean 25-50 kg.	Fat	Lean	Lean

(*d*) *Fish*

Analyses for individual "white" fish (e.g. cod, haddock, whiting), whether sea or fresh water, show no material differences. One set of analytical figures will serve for all. Fatty fish such as herrings show different fat contents at different seasons of the year.

(*e*) *Margarine*

Ordinary margarine has a negligible vitamin A and D content.

TABLE IV[1]

Table of Nutrient Values to be applied to Indigenous Wartime European Food Supplies and also to types of food likely to be imported during the military period per 100 gm. of food as purchased

Abbreviations used in the Table—

—=no data available.

ϕ=the amount of this nutrient present is negligible or doubtful.

( )=provisional factor only.

-C=the carotene content per 100 gm.

*=average nutrient factors which should be used if there is no detailed information available on the type of the commodity.

E.P.=factors apply to edible portion of food only.

Notes on the Table—

1. All factors, unless otherwise stated, refer to the composition of foods as purchased at retail with the exception that meats are on a carcass weight basis. The data, therefore, when applied to the weight of a food as purchased give the composition of the edible portion. In effect they automatically discount the inedible portion.

[1] This Table and the notes to it were drawn up by the Combined Working Party on European Food Supplies.
The Council of British Societies for Relief Abroad is very grateful for permission to include the table and notes in this booklet.

2. No exact data based on analyses were available for some of the types of commodities included in the table. In these cases factors have been estimated on the basis of analyses of similar types of commodities. Where this has been done a conservative estimate on the low side has been made.

3. Carbohydrates are conventionally expressed in two chief ways: (*a*) as available carbohydrate by direct chemical analysis (AC) and (*b*) as carbohydrate estimated arithmetically by difference (CD). For certain foodstuffs the values expressed in these two ways are similar but in others there are considerable differences. Where the values are similar the estimate of available carbohydrate has been used. Where the difference is considerable a compromise has been obtained by calculating the carbohydrate value on the assumption that, after deducting the fibre, one half the carbohydrate not allowed for in the chemical analysis but included in the total carbohydrates estimated by difference is utilized in the body. This may be expressed in the formula $C=\frac{1}{2}(AC+CD—F)$.

4. The available vitamin A is expressed as vitamin A for animal products and as carotene (with a " -C " following the figure) for all other foods. The United Kingdom allowances for vitamin A are 3,000 I.U. and are in terms of vitamin A, whereas those for the United States are 5,000 I.U. and are based on 40 per cent. being derived from vitamin A and 60 per cent. from carotene. The two allowances are therefore in effect identical.

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TABLE IV

	Commodity.	Calories per oz.	Per 100 gm. of food as purchased (see note 1). Water.	Calories per 100 gm.	Protein.	Fat.	Carbo-hydrates.	Calcium.	Iron.	Vitamin A potency.	Vitamin B_1.	Ribo-flavin.	Nicotinic acid.	Ascorbic acid.	Waste.	Remarks.	
1	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
			gm.		gm.	gm.	gm.	mg.	mg.	I.U.	mg.	mg.	mg.	mg.	gm.		
	Meat, Meat Products and Fish																
1	Bacon, American fat (U.S.)	183	18	645	4·7	69·6	ø	9·0	1·0	—	(0·25)	0·13	(0·8)	0	6		1
2	Bacon, fat backs	222	7	780	3·8	85	ø	5·0	1·0	—	0·20	0·10	(0·6)	0	4		2
*3	Bacon, whole sides	112	—	395	9·7	39·6	ø	10	2·0	—	0·50	0·23	(1·6)	0	12		3
*4	Beef, whole carcass, very lean cow	34	55	119	13·8	7·1	ø	9	3·0	(30)	0·07	0·20	4	ø	23		4
5	Beef, whole carcass, lean cow	41	51	145	14·1	9·9	ø	9	3·0	(30)	0·07	0·20	4	ø	23		5
6	Beef, whole carcass, moderately fat cow ..	58	49	204	13·1	16·9	ø	9	3·0	(30)	0·07	0·20	4	ø	20		6
7	Beef, whole carcass, medium grade	62·8	—	221	14·7	18	ø	9	2·0	(30)	0·07	0·20	4	ø	17		7
8	Beef, canned corned	69	53	244	25	16	ø	18	(4)	(30)	0·01	0·20	2·5	0	0		8
9	Beef, dehydrated	159	5	560	50	40	ø	33	12	150	0·12	0·40	8	0	0		9
10	Goat	30	54	107	11·9	6·6	ø	8	2·0	ø	0·15	0·20	4	ø	26	Same figures as 16 (average lean mutton and lamb)	10
11	Horse	34	55	119	13·8	7·1	ø	9	3·0	(30)	0·07	0·20	(4)	ø	23	Same figures as 4 (very lean cow)	11
12	Lamb	38	54	134	12	9·6	0	8	3	(30)	0·15	0·20	4	ø	23		12
13	Meat, luncheon, U.S. average	81	—	285	13·3	21·7	9·0	20	2	0	0·30	0·20	2·7	0	0		13
14	Meat and vegetable stew or hash	34	—	121	9·0	5·0	10·0	26	1·4	1750[1]	0·04	0·13	2·5	ø	0	[1] This figure for stew only	14
*15	Mutton and lamb, average lean	30	54	107	11·9	6·6	ø	8	2	ø	0·15	0·20	4	ø	26		15
*16	Mutton, average carcass	59	53	208	11·7	17·9	ø	8	2	ø	0·15	0·20	4	ø	16		16
17	Mutton, young ewe, intermediate fat	45	54	158	11·9	12·3	ø	8	2·0	ø	0·15	0·20	4	ø	21		17
18	Offal, weighted U.K. average	36	72	128	14·5	7·8	0	{11 3	10 10	2700 —	0·30 0·30	2·50 2	15 7	30 —	0 0	Beef Liver values for vitamins and minerals Beef Kidney values for vitamins and minerals	18
19	Pork, fat, 4/6 months	148	24	522	6·8	55[1]	ø	9	1·5	ø	0·85	0·23	4	ø	13	[1] 50·6% fat when kidney and visceral fat removed	19
20	Pork, youngest and leanest	122	29	430	8·4	44[1]	ø	9	1·5	ø	0·85	0·23	4	ø	18	[1] 41·3% fat when kidney and visceral fat removed	20
21	Pork, bacon type fat	112	31	395	8·7	40	ø	9	1·5	ø	0·85	0·23	4	ø	19		21
*22	Pork, bacon type lean	100	34	351	9	35	ø	9	1·5	ø	0·85	0·23	4	ø	21		22
*23	Poultry, plucked and drawn	27	50	95	12·6	4·9	ø	10	2	ø	0·10	0·10	4	ø	33		23
24	Poultry, canned	56	—	192	29·7	7·9	ø	16	3·2	ø	0·01	0·16	4·8	ø	0		24
25	Rabbit, skinned and gutted	32	55	111	16·6	5	ø	8	2	ø	0·03	0·10	4	0	18		25
26	Sausages, *miscellaneous, all kinds*	108	31	380	21·9	32·5	ø	13	3·3	0	0·20	0·20	3	0	7		26
27	Sausages, semi-dry, e.g. bologna	59	64	208	14·4	15·4	3	8	2·2	0[1]	0·32	0·25[1]	3[1]	0	0	[1] Liver sausage, Vitamin A 6,600 I.U. Riboflavin 1·3 mg. Nicotinic acid 5 mg.	27
28	Sausages, dry, e.g. salami	112	30	393	22	33·9	ø	13	3·3	0	0·22	0·21	3	0	8		28
*29	Veal, lean bobby	26	56	93	13	4·6	ø	9	2	ø	0·10	0·15	5	ø	25	Factors for veal up to 3 weeks old	29
30	Veal, milk fed	36	55	126	12·4	8·5	ø	9	2	ø	0·10	0·15	5	ø	23		30
31	Veal, 8/12 months	40	54	142	13	10	ø	9	2	ø	0·10	0·15	5	ø	22		31

Waste.	Remarks.	
17	18	19
gm.		
33		32
0		33
0		34
0		35
30		36
45		37
35		38
0		39
ø	[1] With backbone discarded	40
ø		41
12		42
0		43
0		44
0	[1] For stall fed cattle take 70 I.U. for Vitamin A	45
0		46
0		47
0		48
0		49
0		50
0		51
0	Netherlands data	52
0		53
0		54
0		55
0		56
0	*Note.*—Precise data of vitamin and mineral content are not available, but for practical purposes the same values can be taken	57
0		58
0		59
0		60
0		61
0		62

TABLE IV—*continued*

	Commodity.	Calories per oz.	Per 100 gm. of food as purchased (see note 1).														Remarks.	
			Water.	Calories per 100 gm.	Protein.	Fat.	Carbo-hydrates.	Calcium.	Iron.	Vitamin A potency.	Vitamin B_2.	Ribo-flavin.	Nicotinic acid.	Ascorbic acid.	Waste.			
1	2	4	5	6	7	8	8	10	11	12	13	14	15	16	17		18	19
			gm.		gm.	gm.	gm.	mg.	mg.	I.U.	mg.	mg.	mg.	mg.	gm.			
	Fish																	
*32	Fish, dressed	19	52	66	12·7	1·7	ø	14	0·5	54	0·04	0·10	2	ø	33			32
33	Fish, fresh water, fillet	27	77	94	18	2·5	ø	20	0·7	80	0·05	0·13	3	ø	0			33
34	Fish, white, sea, fillet	21	80	73	16	1	ø	20	0·7	80	0·05	0·13	3	ø	0			34
35	Fish, pelagic E.P.	46	69	161	16	10·8	ø	20	0·7	80	0·05	0·13	3	ø	0			35
36	Herrings	40	50	139	11·2	10·5	ø	70	1·1	105	0·05	0·13	4	ø	30			36
37	Fish, cod, salt, wet	15	30	51	12·1	0·3	ø	19	0·8	ø	0·03	0·20	3	ø	45			37
38	Fish, salt, hard, dry	34	26	118	27·3	1	ø	42	1·6	ø	0·04	0·20	3	ø	35			38
39	Fish, shell, E.P.	26	74	93	18	1·5	2	100	0·7	200	0·05	0·10	4	ø	0			39
40	Fish, canned (except when in oil)	48	67	170	20	10	ø	200[1]	1·0	25	0·02	0·20	6	0	ø		[1] With backbone discarded	40
41	Fish, canned (in oil)	87	50	305	20	25	ø	200[1]	3	250	0·02	0·20	4	0	ø			41
	Eggs																	
42	Fresh, shell	40	74	139	11·4	10	0·8	50	2·5	880	0·12	0·30	ø	ø	12			42
43	Dried, whole	163	5	574	45·8	42	3·2	219	11	3000	0·40	1·20	0·3	0	0			43
	Milk and Milk Products																	
44	Milk (cow) std. 2·5% fat	15	89	53	3	2·5	4·6	120	0·2	140[1]	0·04	0·15	0·1	1	0			44
45	Milk (cow) Whole 3·0% fat	16	88·7	57	2·9	3	4·6	120	0·2	140[1]	0·04	0·15	0·1	1	0			45
46	Milk (cow) Whole 3·3% fat	17	88·3	60	3	3·3	4·6	120	0·2	140[1]	0·04	0·15	0·1	1	0		[1] For stall fed cattle take 70 I.U. for Vitamin A	46
47	Milk (cow) Whole 3·5% fat	18	88	62	3·1	3·5	4·6	120	0·2	140[1]	0·04	0·15	0·1	1	0			47
48	Milk (cow) Whole 3·7% fat	18	87·7	64	3·2	3·7	4·6	120	0·2	140[1]	0·04	0·15	0·1	1	0			48
49	Milk (sheep) Whole	30	81	104	6·5	6·7	4·5	140	0·7	80	0·05	0·10	4	1	0			49
50	Milk (goat) Whole	20	86·5	71	4·4	4·1	4·2	140	0·7	80	0·05	0·10	4	1	0			50
51	Milk (cow) Skimmed	10	91	34	3·2	0·2	4·9	124	0·1	ø	0·04	0·10	0·1	1·5	0			51
*52	Cheese (cow) whole milk, hard	116	37	410	24·9	34·5	ø	850	1	1400	0·04	0·50	0·03	0	0			52
53	Cheese (cow) whole milk, hard	87	45	308	30	20	2	850	1	1400	0·04	0·50	0·03	0	0		Netherlands data	53
54	Cheese (sheep) whole milk hard	106	39	372	21	32	ø	850	1	1400	0·04	0·50	0·03	0	0			54
55	Cheese (goat) whole, semi-soft	83	55	292	17	24	2	80	0·2	(70)	ø	0·10	ø	0	0			55
56	Cheese (sheep) whole, soft	62	65	218	12	18	2	80	0·2	(70)	ø	0·10	ø	0	0			56
57	Cheese (cow) partially skimmed milk, hard	58	53	203	33	7	2	80	0·2	(20)	ø	0·10	ø	0	0			57
58	Cheese (cow) skimmed milk, hard	62	40	220	46	4	ø	80	0·2	(20)	ø	0·10	ø	0	0		*Note.*—Precise data of vitamin and mineral content are not available, but for practical purposes the same values can be taken	58
59	Cheese (cow) skimmed milk, semi-soft	47	57	167	33	3	2	80	0·2	(20)	ø	0·10	ø	0	0			59
60	Cheese (cow) skimmed milk, soft	31	73	108	20	2	2·5	80	0·2	(20)	ø	0·10	ø	0	0			60
61	Cheese (cow) whey, hard	69	30	244	9	4	43	80	0·2	(20)	ø	0·10	ø	0	0			61
62	Cheese (cow) whey, soft	36	68	127	22	3	3	80	0·2	(20)	ø	0·10	ø	0	0			62

TABLE IV—*continued*

	Commodity.	Calories per oz.	Per 100 gm. of food as purchased (see note 1). Water.	Calories per 100 gm.	Protein.	Fat.	Carbo-hydrates.	Calcium.	Iron.	Vitamin A potency.	Vitamin B_1.	Ribo-flavin.	Nicotinic acid.	Ascorbic acid.	Waste.	Remarks.	
1	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
			gm.		gm.	gm.	gm.	mg.	mg.	I.U.	mg.	mg.	mg.	mg.	gm.		
	Milk and Milk Products—*continued.*																
63	Milk, whole, condensed, and/or evaporated unsweetened, U.S.A.	40	74	140	7	8	10	240	0·4	410	0·05	0·36	0·20	0	0		63
64	Ditto, sweetened	89	28	314	8·2	9·2	49·6	290	0·2	370	0·10	0·36	0·20	ø	0		64
65	Ditto, skimmed, sweetened	76	29	266	9·5	0·5	55·8	320	0·3	20	0·10	0·36	0·20	ø	0		65
66	Milk, powdered, whole, U.S.A.	138	5	485	25·6	26·7	35·6	900	1·6	1400	0·30	1·60	0·70	0	0		66
67	Milk, powdered, skimmed	102	5	360	35·6	1	52	1240	2	60	0·30	1·90	1·10	0	0	Goat and sheep milk the same	67
	Fats—fresh																
68	Butter, fresh, table	212	15	745	0·5	82·5	ø	15	0·2	2700	ø	ø	ø	0	0		68
69	Butter: as fat without water	248	0	875	0·6	97	0	15	0·2	3200	0	0	0	0	0		69
70	Margarine—oleo	218	14	768	0	85·3	0	4	0	2000[1]	ø	ø	ø	0	0	[1] Vitaminized only	70
	Fats—other																
71	All other fats, lard, edible tallow, marine and vegetable oils	253	1	891	0	99	0	0	0·1	ø	0	0	0	0	0		71
	Sugars and Preserves																
72	Sugar, white	113	0	400	0	0	100	0	0	0	0	0	0	0	0		72
73	Sugar, brown	113	ø	400	0	0	100	75	1	ø	ø	ø	0	0	0		73
74	Assorted jams and preserves and molasses	72	30	252	ø	0	63	20	0·3	ø	ø	ø	0·1	0·1	0	Basis of 20% fruit taken for jams	74
75	Sweets, candies	105	3	368	0	ø	92	0	0	0	0	0	0	0	0		75
	Cereals																
76	Whole wheat, U.K. (100%)	90	13	317	11·5[1]	2·4	62	30	3·5	ø	0·40	0·17	5	0	0	[1] Protein may vary from 8 to 15% but calorie value remains the same	76
77	Flour, wheat, 85% extraction	98	13	346	11	1·6	72	20[1]	2·5	ø	0·30	0·10	1·5	0	0	[1] As fortified in U.K. the calcium value is 79 mg.	77
78	Flour, wheat, 70% extraction	100	13	351	10	1	75·5	16	2	0	0·06	0·05	1	0	0		78
79	Flour, wheat, U.S. enriched	100	—	355	11·2	1·1	75	16	2·9	0	0·44	0·26	3·5	0	0		79
80	Bread, 85% extraction flour[1]	77	37	249	7·9	1·1	52	14	1·8	ø	0·20	0·07	0·7	0	0	[1] Bread taken as 72% of corresponding flour	80
81	Barley, pearl or flour, 70% extraction	97	10	343	10	1·7	72	15	2	0	0·12	0	2·8	0	0		81
82	Maize (cornmeal[2]) 95% extraction	95	12	334	9	2	70	16	1	—[3]	0·18	0·06	1·5	0	0	[1] Cornflour—corn starch 350 cal., 86% CHO	82
83	Oat Flour or Oatmeal 65% extraction	109	9	386	12	8·7	65	60	5	ø	0·50	0·14	1·3	0	0	[2] Vitamin A varies—yellow maize 300-C, white, ø	83
84	Rice, lightly milled to 5% bran yield	99	12	349	7	1	78	10	2	ø	0·20[1]	0·10	1	0	0	[1] Highly milled 0·06	84
85	Rye 85-90% extraction	92	12	326	8	2·5	68	50	3·5	ø	—	—	—	0	0		85
86	Biscuits, Army, U.K.	117	—	412	10	8	75	28	1·4	0	0·03	(0·10)	(1)	0	0		86
87	Biscuits, Army, U.S.	117	—	412	8·8	9·4	73	116	5·1	0	0·15	0·17	2	0	0		87
88	Macaroni, spaghetti, pastes	103	11	361	13	1·4	74	22	1·2	0	0·10	0·06	2	0	0		88

	Commodity.	Calories per oz.	Ascorbic acid.	Waste.	Remarks.	
1	2	4	16	17	18	19
			mg.	gm.		
	Milk and Milk Products—*continued.*					
63	Milk, whole, condensed, and/or evaporated unsweetened, U.S.A.	40	0	0		89
64	Ditto, sweetened	89	0	0		90
65	Ditto, skimmed, sweetened	76	0	0		91
66	Milk, powdered, whole, U.S.A.	138	0	0		92
67	Milk, powdered, skimmed	102	0	0	[1] Same figures can be used for low fat flour	93
	Fats—fresh					94
68	Butter, fresh, table	212	0	0		
69	Butter: as fat without water	248	0	0	[1] For peanut butter vitamin B_1 0·2 mg.	95
70	Margarine—oleo	218	0	0[2]	[2] When in shells allow 28% waste	96
	Fats—other					
71	All other fats, lard, edible tallow, marine and vegetable oils	253	0	40		97
	Sugars and Preserves					
72	Sugar, white	113	0	30		98
73	Sugar, brown	113	0	25	[1] For dehydrated cabbage with 4% moisture, take vit. A=500-C, vit. C=200 mg. when packed in gas and 100 mg. when packed in air	99
74	Assorted jams and preserves and molasses	72	0·1	30	[2] For white cabbage take vit. A=50-C.	100
75	Sweets, candies	105	0	10		101
	Cereals					
76	Whole wheat, U.K. (100%)	90	0	55		102
77	Flour, wheat, 85% extraction	98	0	10	[1] For dehydrated carrots with 4% moisture take vit. A—80,000-C.	103
78	Flour, wheat, 70% extraction	100	0	25		
79	Flour, wheat, U.S. enriched	100	0			
80	Bread, 85% extraction flour[1]	77	0			
81	Barley, pearl or flour, 70% extraction	97	0			
82	Maize (cornmeal[2]) 95% extraction	95	0			104
83	Oat Flour or Oatmeal 65% extraction	109	0	2		105
84	Rice, lightly milled to 5% bran yield	99	0			
85	Rye 85-90% extraction	92	0			
86	Biscuits, Army, U.K.	117	0	28		106
87	Biscuits, Army, U.S.	117	0	0		107
88	Macaroni, spaghetti, pastes	103	0			

TABLE IV—*continued*

	Commodity.	Calories per oz.	Per 100 gm. of food as purchased (see note 1).													Remarks.	
			Water.	Calories per 100 gm.	Protein.	Fat.	Carbohydrates.	Calcium.	Iron.	Vitamin A potency.	Vitamin B_1.	Riboflavin.	Nicotinic acid.	Ascorbic acid.	Waste.		
1	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
			gm.		gm.	gm.	gm.	mg.	mg.	I.U.	mg.	mg.	mg.	mg.	gm.		
	Cereals—*continued.*																
89	Miscellaneous products, Sago, Tapioca and Cornstarch	101	12	357	9	1	78	10	2	0	0·20	0·01	1	0	0		89
90	Semolina and Farina	99	12	349	7	1	78	10	2	0	0·20	0·01	1	0	0		90
	Legumes, Pulses and Products																
91	Pulses, Beans, Dry Lentils, Haricot, Peas	87	7	305	24	1	50	100	8	ø	0·50	0·30	2	ø	0		91
92	Soya, 95% of bean	121	7	428	40	24	13	218	7	ø	0·70	0·32	4	ø	0		92
93	Soya grits, medium fat[1]	74	8	262	40·1	5·1	14	330	13	110-C	0·60	0·40	4	ø	0	[1] Same figures can be used for low fat flour	93
94	Soups, dehydrated, U.S. type	95	8	334	18	1·1	63	133	8·5	100-C	0·40	0·20	2	ø	0		94
95	Peanuts, roasted and shelled, or peanut butter ..	170	2·6	560	26·9	44	14	67	2	—	0·40[1]	0·13	16	0	0[2]	[1] For peanut butter vitamin B_1 0·2 mg.	95
96	Nuts, Barcelona	110	7	388	7·7	38·4	2·8	70	1·5	ø	—	—	—	—	40	[2] When in shells allow 28% waste	96
	Vegetables, Leafy Green and Yellow																
97	High carotene—dark green, e.g. kale, chard, mustard greens, watercress, spinach, turnip greens, beet greens	6·2	63	22	2	0·2	3	100	1·5	6000-C	0·10	0·12	0·40	50	30		97
98	Low carotene—pale green, cabbage[1] [2], broccoli, Brussells sprouts, green pepper	9	65	30	3	0·2	4	100	1·5	600-C	0·10	0·12	0·40	50	25	[1] For dehydrated cabbage with 4% moisture, take vit. A=500-C, vit. C=200 mg. when packed in gas and 100 mg. when packed in air	98
99	Lettuce, Endive	3	66	10	1	ø	1·5	25	0·5	1500-C	—	0·10	0·10	5	30	[2] For white cabbage take vit. A=50-C.	99
100	Beans, green in pod, string, french, runner	8	80	28	1·8	0·1	5	58	1·3	540-C	0·07	0·11	0·44	19	10		100
101	Peas, Beans, shelled (undried); Peas, garden and field Broad Beans, green Lima	9·4	35	33	2·9	ø	5·4	3	0·2	80-C	0·08	0·09	0·68	5	55		101
102	Carrots, fresh, without tops	8	80	28	0·8	0·1	6	35	0·6	1200-C[1]	0·06	0·05	0·50	5	10	[1] For dehydrated carrots with 4% moisture take vit. A—80,000-C.	102
103	Squash Pumpkins (yellow)	7	66	24	0·8	0·1	5	15	0·6	840-C	0·03	0·04	0·50	8	25		103
	Tomatoes																
104	Tomatoes, canned	6	94	22	1	0·2	4	7	0·6	940-C	0·05	0·03	0·68	17	0		104
105	Tomatoes, fresh, red	7	92	23	1	0·3	4	9	0·4	1200-C	0·05	0·04	0·70	25	2		105
	Citrus Fruits																
106	Oranges, Lemons, Grapefruit, etc.	7	63	25	0·6	0·2	5·2	15	0·3	180-C	0·03	0·01	0·16	25	28		106
107	Citrus powder, synthetic, U.S.	111	0	392	0	0	98	0	0	0	0	0·05	0·07	860	0		107

TABLE IV—*continued*

	Commodity.	Calories per oz.	Per 100 gm. of food as purchased (see note 1). Water.	Calories per 100 gm.	Protein.	Fat.	Carbohydrates.	Calcium.	Iron.	Vitamin A potency.	Vitamin B_1	Riboflavin.	Nicotinic acid.	Ascorbic acid.	Waste.	Remarks.	
1	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
			gm.		gm.	gm.	gm.	mg.	mg.	I.U.	mg.	mg.	mg.	mg.	gm.		
	Potatoes																
108	Potatoes	19	66	65	1·7	ø	14·6	8	0·6	30-C	0·10	0·04	1	10[1]	15	[1] All season value—for early crop take 20 mg. and for late season take 5 mg.	108
109	Potato, flour or dehydrated	91	10	320	8	0·5	71	(42)	(5)	ø	0·14	0·07	4	—	0		109
	Roots, Other																
110	Beets, Parsnips (without tops)	14·2	66	50	1·4	0·1	10·9	20	0·7	20-C	0·04	0·04	0·80	10	25[1]	[1] Waste with tops—47%	110
111	Turnips, Swedes, Rutabaga	9·1	76	32	1	0·1	6·8	50	0·4	ø	0·03	0·05	0·60	30	15		111
112	Onions, Leeks	11·4	82	40	0·3	0·1	9·5	28	0·3	ø	0·02	0·03	0·60	10	6		112
*113	Weighted average for all vegetables (ex. potatoes)	4·3	69	15	1·3	ø	2·4	80	1·3	1800-C	0·10	0·12	0·52	40	26		113
	Fruits																
	STONE FRUITS																
114	Plums, Peaches, Apricots	8·5	80	30	0·6	ø	7	30	0·3	600-C[1]	0·02	0·04	0·50	8	9	[1] For apricots and yellow peaches take vit. A = 1500-C	114
	SMALL FRUITS																
115	Blackberries, Raspberries and Strawberries	7·4	85	26	0·9	ø	5·6	40	1	100-C	0·02	0·02	0·16	30	1		115
*116	Weighted average for all fresh fruits	9·4	85	33	0·3	ø	8	16	0·4	300-C	0·04	0·04	0·02	5	6		116
117	DRIED FRUITS	58·4	18	206	2·5	ø	49	60	3	500-C[1]	0·10	0·10	0·40	ø	0	[1] For apricots and yellow peaches take vit. A = 4000-C	117
	Miscellaneous																
118	Chocolate, vitaminized	147	—	518	4·6	32·2	52·5	1·15	31·5	7000	3·50	0·24	1·05	0·35	2		118
119	Cocoa, raw bean	130·4	—	460	10	40	15	—	—	—	—	—	—	—	25		119
120	Cocoa powder	92	4	325	8	18·8[1]	31	—	—	—	—	—	—	—	0	[1] For breakfast cocoa take 23·8 fat	120
121	Beer	5·7	—	20	—	—	—	—	—	—	—	—	—	—	0	Lager wartime	121
122	Wine	18·1	—	64	—	—	—	—	—	—	—	—	—	—	0	Bordeaux 9% alc., 0·24% sug.	122
123	Spirits	49·4	—	280	—	—	—	—	—	—	—	—	—	—	0	40% alc.	123
124	Soup powder from legumes (see 94)																124
125	Dried Yeast (brewers)	—	—	—	50	1·6	—	77	20	0	16[1]	4	40	—	0	[1] 4 mg. for food yeast (torula)	125
126	Meat extract	—	—	—	—	—	—	—	—	—	—	—	—	—	0		126

CHAPTER 7

THE STORAGE AND HANDLING OF CERTAIN FOODSTUFFS

THE following notes may prove to be useful to relief workers, although it is uncertain whether some of the foods described will actually be among supplies made available for relief work in Europe.

1. Canned Foodstuffs

Cases of canned foodstuffs must be stored in clean, cool and *dry* places.

All cases showing signs of damage should be set aside for subsequent examination of the cans inside. Cases showing signs of sweat or condensation should also be set aside.

Heavily rusted nail-heads and wire straps, and stained cases are indications that the cans inside may be heavily rusted, damp or damaged.

Cans with leaks, or with domed, swollen or springy ends, must invariably be rejected.

Cans which have received damage likely to have forced a seam should also be rejected. It is difficult for a non-technical person to judge this point; but a sharp indentation immediately near a seam usually means that the can is defective. If possible, expert advice should be obtained, but for general guidance, chances should not be taken with cans possibly made defective by heavy damage.

Similar considerations apply to heavily rusted cans. Heavy rusting along the seams may make them defective.

It follows that in storing cases of canned goods damp premises must not be used, and conditions leading to condensation must be avoided. Otherwise heavy rusting of the cans and welting of the labels will occur.

2. Chocolate (Vitaminized U.K. Specification)

This chocolate contains added vitamins A, B_1, C and D and calcium carbonate in the following proportions:

Vitamin A	2,000 I.U. per ounce
Vitamin B_1	1 mg. per ounce
Vitamin C	10 mg. per ounce
Vitamin D	700 I.U. per ounce
Calcium carbonate	300 mg. per ounce

Nearly all this chocolate is moulded in two-ounce bars, but a small proportion will be found to be one-ounce bars. *The primary purpose of this chocolate is to provide vitamin supplements for children aged 2-14 years, and it should only be used in areas where the children are, or are thought to have been, suffering from vitamin deficiencies.* An appropriate dose for a child is one ounce of chocolate per day. This quantity of chocolate will also provide about 150 calories.

3. Egg (Dried)

Dried egg, like whole milk powder, should be regarded as a relatively perishable foodstuff. It is sensitive both to moisture and to oxygen. The deleterious changes caused by both these agencies are accelerated by high temperatures. Every effort therefore should be made, if dried egg is to be stored, to obtain cool and dry conditions. Under good storage conditions it is not advisable to keep it for more than 6 months.

It is most important that when dried egg has been reconstituted it should be cooked and consumed as soon as possible. In no circumstances should it be reconstituted and then left overnight before cooking. The maximum time, in cool conditions, that it should be held after reconstitution, is about 3-4 hours. This is because reconstituted egg, precisely because of its high nutritional quality, is equally an excellent medium for the growth of bacteria. No growth goes on in the dry state, but it can readily occur after reconstitution.

It is difficult to indicate precise methods for reconstitution on a large scale, as so much depends on the type of equipment and utensils available. But the guiding principle for getting

good results, which applies to both large and small scale use, is to obtain a smooth cream as the water is added. To obtain the equivalent of fresh eggs, about $2\frac{1}{2}$-$2\frac{3}{4}$ parts by weight of water should be added to one part by weight of dried egg.

The following three methods for cooking dried eggs are given as the most suitable.

General Directions for Mixing

Put the dried eggs into a bowl, smooth out the lumps with a wooden spoon or whisk (the lumps could also be removed by sifting the powder through a fine sieve), and add half the quantity of water required by the recipe. Mix to a smooth cream. Add the rest of the water and beat well.

Note.—The flavour of dried egg is improved if stock or vegetable water is used in place of water for reconstitution.

" *Hard Boiled* " *Eggs*

Quantities for 100 persons.—Dried eggs, 2 lb. Water, $4\frac{1}{2}$ pints. Salt and pepper.

Reconstitute the eggs and add the seasoning. Pour the mixture into greased basins and steam gently till set. When cold, turn out, cut up and use as hard boiled eggs.

Scrambled Eggs

Quantities for 100 persons.—Dried eggs, 2 lb. Fat, $\frac{1}{2}$ lb. Water, 4 pints. Milk, 3 pints. Salt and pepper.

Reconstitute the egg, add the milk, seasonings and fat. Cook slowly, stirring as little as possible, until creamy.

Omelette

Quantities for one person.—Dried eggs, 2 level tablespoons. Fat, $\frac{1}{4}$ oz. Water, 4 tablespoons. Salt and pepper.

Reconstitute the eggs with the water, beat well; add the seasoning. Heat the fat in an omelette pan, pour in the egg mixture and cook slowly, stirring lightly, until the mixture begins to set. Fold over and serve immediately.

Note.—If a small omelette is required, allow 1 level tablespoonful of dried egg per person.

4. Flour (Storage of)

(*a*) *White Flour.* The lower the moisture content of flour, the better it keeps; flour with a moisture content of 14 per

cent. stores better than one with a moisture content of 15 per cent. Flour requires a dry atmosphere, good ventilation and even, cool conditions of temperature for its storage. Wherever possible, a store situated on a damp or low-lying site should be avoided. The store should be free from smells, particularly oils, disinfectants and tars. Animal feeding stuffs should not be in the same store because of the greater danger of pest infestation.

The walls of the store should be of brick, concrete or stone and the roof of solid construction, weatherproof and free from glass. Direct sunlight on the flour should be avoided. A lofty store is better than a low store, and on cool dry days it is an advantage to open the doors. The store must be free from vermin (rats, mice, etc.), and all steps should be taken to keep it free. Before the store is filled, the walls, ceilings and floors should be thoroughly cleaned and, if possible, the walls and ceilings limewashed. Dry wooden floors are best, and on such dunnage is not essential, although, if available, it is an improvement upon any floor. On concrete, brick or composition floors in contact with the earth, e.g. ground floors, dunnage consisting of dry wooden strips should be used, as without it the flour is likely to become damp and cake.

The best method of storing flour is not more than 3 bags high on end; this is preferred to the equivalent in height of 8 flat because of the better ventilation between the bags and also because it is more economical in labour. Flour with a moisture content of 14 per cent. or less can, however, be stored 10 to 12 high flat, and in a good store should remain in sound condition for at least six months. With flour of a higher moisture content, e.g. 15 to 15½ per cent., there is a danger of caking in the lower bags if stored higher than 3 or the equivalent, 8 flat. *No attempt should be made to store 10-12 high, however, except in a thoroughly good store.* Storage greater than 12 high, with flour of any moisture content, cannot be recommended. Flour stored 3 high endways or 8 high flat will require a floor capable of taking 3 cwt. per sq. ft.; stored 10-12 high the floor must take 4 cwt. per sq. ft.

Flour should never be stored touching the wall, but a space

allowed so that a storekeeper can walk round to inspect. The size of the flour bays will vary with the dimensions of the store, but the controlling factor should be the ability to empty the store of its stock in rotation, always provided that at least 15 per cent. of the floor space is given up to gangways. It is preferable to have a number of narrow gangways rather than one or two wider ones. Gangways should, where possible, be sited under roof gutterings or any weak portion of the roof where leakage is most likely to occur. This is most desirable where single storey buildings of the workshop type are used. In order to facilitate rotational delivery, all bays should be clearly dated.

Periodical inspection of flour stores for the presence of mites and insect pests is advisable.

(*b*) *High Extraction Flours* (*i.e. over 80 per cent.*). The conditions laid down for the type of store, viz. that it should be clean, cool and dry, require special emphasis in the storage of high extraction flours. Such flours are also more susceptible to insect infestation than white flour, and inspection for pests should be carried out frequently and thoroughly. If any infestation is observed it should be dealt with immediately.

The moisture content is of great importance in determining the storage life of high extraction flours, and if possible it should not be more than 14 per cent. At this moisture content, in a good store, 85 per cent. extraction flour for example should keep for about 8 months; at 14½ per cent. moisture it will keep for about 5 months.

Storage of the bags 3 high on end is much to be preferred to the equivalent in height of 8 flat. No attempt should be made to store higher than 8 flat except in a good dry store, and then only if shortage of space makes it absolutely essential for a short period of time.

If for any reason bags become damp, the contents should be used at once.

(*c*) *Flours from Mixed Cereal Grains.* Mixed cereal flours are most likely to be of the high extraction type, and the same precautions should therefore be observed.

5. Meat (Dried)

Dried meat, if available, will be in the form of pre-cooked minced meat. It is prepared by drying partially cooked minced meat. The juice produced during cooking is added before the meat is dried. The product is practically identical in nutritive value (including vitamin content) with freshly cooked meat, but the fat content has been standardized at 40 per cent. of the dried product.

Dehydrated meat is compressed and packed in air-tight cans, but is not gas packed. Under these conditions the meat will store for long periods without loss of flavour or nutritive value. Dried meat when cooked is almost indistinguishable from fresh meat, although the methods of serving it are limited by the fact that it is dried in the minced form. The following method should be used for cooking:

Method. Crumble the block. To one part by weight of dried meat add 1½ parts of water, salt and seasoning to taste, simmer or steam ½-1 hour.

It is recommended that the dried meat should be reconstituted before use in two ways, depending upon whether it is required hot and ready for serving, or required cold for use as an ingredient of a dish which will be subsequently cooked before being served.

If required hot, it is recommended to add the requisite quantity of water to the meat and to simmer or steam for ½-1 hour with salt or seasoning as required. The meat is then ready for serving.

If required cold, the meat is allowed to soak in the requisite quantity of cold water for 1½-2 hours. (If this method is used it must be emphasized that once water has been re-added to dried meat it becomes a perishable product and, in the same way as raw meat, must be kept in a cool place until required for use.)

6. Meat (Emergency Preservation of)

The only simple, practical means of preserving meat under emergency conditions is by salting. It will serve to keep meat

in an edible condition for a few months. For this primitive process to be successful, several factors of importance must be carefully noted:

(*a*) The meat must be cut into fairly small pieces, with a thickness not greater than 3 inches and preferably less.

(*b*) The salt treatment must be started before blowfly has had a chance to infest the meat. The packing in salt must be done so that every surface and crevice is covered with salt, as a further protection against blowfly.

(*c*) Large quantities of salt are required. The ratio of salt to meat should be at least 1: 1.

(*d*) The average prevailing temperature must not be high, preferably below 120° F.

A recommended procedure is as follows:

100 lb. of pieces of meat are rubbed (*a*) with 10 oz. of saltpetre (potassium nitrate); (*b*) with 11 lb. of salt. If nitrate is not available, salt alone can be used. The meat is then laid down in a tub or other suitable receptacle for two days. The pickle which forms during these two days is thrown away and the pieces of meat are then rubbed vigorously all over with salt and then bedded down in about 100 lb. salt. Care must be taken to see that the pieces of meat are completely surrounded with salt—above, below and round the sides. Each piece should be separated both from the neighbouring pieces and from the sides of the receptacle by a layer of salt. Every crevice made in the butchering must be packed with salt.

When the meat is taken for cooking it must be soaked in cold water for about 48 hours with many changes of water. Cooking should be by slow simmering for several hours to make the toughened lean as palatable as possible. In the final stages of simmering, carrots or other vegetables may be added.

With long storage by this method the fat becomes rancid, and it is therefore better adapted for use with lean meat.

7. Milk Products

The relationship between liquid milk and the products derived from it—condensed milk and milk powder—is best

shown by a comparison of their chemical composition. This is given in the following Table.

	%				Calories
	Water.	Protein.	Fat.	Carb.	per 100 gm.
Whole Fresh Milk ..	88	3·3	3·6	4·4	63
Skimmed Fresh Milk	91	3·4	0·1	4·6	33
Whole Sweetened Condensed Milk (U.K.)	28	8·2	9·2	49·6	314
Whole Unsweetened Condensed Milk (U.K.) (evaporated)	68	8·5	9·2	11·5	163
Whole Unsweetened Condensed Milk (U.S.A.) (evaporated)	74	6·9	8·0	9·4	137
Whole Milk Powder	4	25·6	26·7	35·6	485
Skimmed Milk Powder	5	35·8	0·7	47·9	341

The principle of working out equivalent quantities may be illustrated by comparing fresh whole milk and whole milk powder. From the above Table, fresh whole milk contains 88 per cent. water and therefore 12 per cent. solids. Whole milk powder contains 4 per cent. water and therefore 96 per cent. solids. Whole milk powder is therefore fresh milk concentrated 96/12, i.e. 8 times. Conversely, then, to prepare the equivalent liquid milk from whole milk powder, the latter must be diluted 8 times. Thus 10 gm. whole milk powder makes 80 gm. equivalent liquid milk. That is, to a given weight of whole milk powder add seven times its weight of water. Since water will normally be measured by volume, it is useful to remember that one gallon of water weighs approximately ten pounds, or that one litre of water weighs one kilogram.

Applying this principle we obtain the data given in the Table below.

TO OBTAIN APPROXIMATE EQUIVALENT OF LIQUID MILK:

To one part by weight of:	
Whole Milk Powder	add 7 parts by weight of water
Skimmed Milk Powder	add 9 parts by weight of water
Unsweetened Condensed Milk (U.S.A.)	add 1-1·1 parts by weight of water
Unsweetened Condensed Milk (U.K.)	add 1·5-1·6 parts by weight of water

In the case of sweetened condensed milk, there is of course no directly comparable liquid equivalent. Comparison can, however, be made in terms of calories or proteins, etc. Thus sweetened condensed milk has a calorific value about five times that of liquid milk. Therefore fivefold dilution will give a liquid of approximately the same *calorific value* as liquid milk. On the other hand the protein content is about 2·5 times that of liquid milk; therefore to obtain a liquid of *protein content* comparable to that of liquid milk, approximately 1·5 parts by weight of water should be added to 1 part by weight of sweetened condensed milk.

Both whole and skimmed milk powder should be stored under the coolest and driest conditions obtainable.

Whole milk powder, unless packed in a hermetically sealed can in an inert gas, gradually becomes rancid owing to oxidation of the fat by the oxygen of the atmosphere. Other undesirable changes proceed more rapidly as the powder picks up moisture. Its storage life with usual types of packaging, i.e. in tins but without gas packing, in a cool dry store is about 6 months. In hot climates it tends to deteriorate more rapidly.

Skimmed milk powder is not susceptible to oxidative rancidity, because it contains little fat. It is, however, equally important to reduce the uptake of moisture to a minimum. If the moisture content is above 7 per cent., undesirable changes occur. In addition, uptake of moisture increases the tendency for the powder to cake. Under dry cool conditions the storage life of skimmed milk powder is about 12 months.

8. Potato, Dried

Dried potato may be available either in the form of strips or dice. It is likely to be packed either in moisture-tight tins or in special non-metal packages, e.g. in laminated bags enclosed in fibre-board cartons. With prolonged storage (e.g. 12 months in temperate climates) some darkening in colour and loss of palatability is to be expected, but the product will retain its nutritional value in carbohydrates unimpaired. *This potato cannot be regarded as a source of vitamin C.*

If cooking instructions are not given with the package the following method should be used:

Method. Cover with boiling water, keep hot (not quite boiling) for about an hour, then boil gently in this water until tender (5-20 minutes), adding more water if necessary.

More salt is required than with fresh vegetables.

1 lb. dried potato will give about 5 lb. when cooked.

Dried potato may also be available in the form of compressed blocks packed in moisture-tight tins. Compression allows considerably greater weight to be packed in each tin than when the material is filled loose into the container.

The palatability, nutritive value and storage properties of the blocks will be similar to those of the uncompressed strips or dice noted above. Instructions for cooking, however, are slightly different, viz.:

Place the blocks in boiling water (4 blocks, approximately 1 lb. to 1 gallon) and keep hot for two hours, during which time the blocks will have broken up into separate strips. The water must not be allowed to approach boiling during this time. A temperature of 140°-180° F. (just too hot to hold a finger in) is that recommended. At the end of the two hours bring to the boil and boil gently till tender (5-15 minutes).

More salt is required than with fresh vegetables.

1 lb. of dried potato blocks will give about 5 lb. when cooked.

9. Pulses (Germinated) as a Source of Vitamin C

Dried pulses, e.g. peas and beans, are good sources of vitamin B_1, but not of vitamin C. If, however, these seeds are soaked in water until germination (sprouting) has taken place, they will be found to contain very useful amounts of vitamin C and increased amounts of vitamin B_1. Vitamin C is synthesized by the seed during germination, and a similar development of vitamin B_1 is probable.

For example, the following figures show how the vitamin B_1 and C contents of dried peas increase during germination.

	Vitamin B_1	*Vitamin C*
	I.U./100 gm.	mg./100gm.
Before germination ..	40-100	Negligible
After germination ..	10% increase	82

The vitamin C has been shown to reside chiefly in the rootlet.

Sprouted pulses, therefore, are very useful sources of these vitamins, in addition to other valuable nutrients, and it is noteworthy that they are eaten in this form by the Chinese.

Methods of Germination. Cover the dried pulses with water and leave overnight. Then remove excess water and spread the soaked peas on flannel, or other suitable material, supported in a container of water, so that they are kept thoroughly moist without being totally immersed. Leave in the dark for about 48 hours or until the shoots are about $\frac{1}{2}$ inch long. Broken and dead peas which fail to germinate tend to putrefy and grow moulds. On the large scale they are difficult to remove, but on a small scale they can be picked out by hand.

10. Soups (Dried)

There are several types of dried soup powders that might become available for relief work, some of which are of American origin and some English. Those most likely to be encountered are:

U.S.A.	*U.K.*
1. Vegetable Stew	4. Roller Dried Soup (meat and vegetable)
2. Pea-soya soup (compressed or powder)	5. Compounded soup powder
3. Breakfast cereal	

U.S.A. Dried Soups

1. The *Vegetable Stew* has a basis of pea flour and soya supplemented by quantities of dried potato, dried carrot, cereal and yeast. In the dry condition it has the following protein and calorie values:

	per 100 gm.	*per oz.*
Protein	21 gm.	6 gm. approx.
Calories	335	95 approx.

This stew should be reconstituted as follows:

Soak one part of the powder in 5 parts of water for one hour, then cook for 30 minutes.

2. The *Pea-Soya Soup* also has a pea-soya basis, but in this case a proportion of skimmed milk powder and vegetable protein derivative is present. Protein and calories on the dry basis are as follows:

	per 100 gm.	*per oz.*
Protein	29 gm.	8 gm. approx.
Calories	277	78 approx.

This soup should be reconstituted as follows:

Mix one part of the powder with 5 parts of water; bring to the boil and boil for 5 minutes.

3. About half of the *Breakfast Cereal* is wheat and the remainder is soya and skimmed milk powder with sugar and salt. This combination yields:

	per 100 gm.	*per oz.*
Protein	20 gm.	5·7 gm. approx.
Calories	360	100 approx.

This cereal should be reconstituted as follows:

Mix one part of the powder with 5 parts of water and boil for 20 minutes.

The reconstituted soups will therefore contain one-sixth of the quantities of protein and calories given above.

U.K. Dried Soups

4. The *Roller Dried Soup* (L.T.R.S. type) is a dried meat and vegetable compound soup powder, and on the dry basis will provide the following:

	per 100 gm.	*per oz.*
Protein	24·5 gm.	7 gm. approx.
Calories	475	135 approx.

It is readily reconstituted by mixing one part of powder with 7 parts of boiling water. No further cooking is required.

5. The *U.K. Compounded Type of Dried Soup* is also a pea-flour soya basis with equal parts (10 per cent.) of skimmed milk powder, dried potato and oatmeal added. Such a powder yields on the dry basis:

	per 100 gm.	*per oz.*
Protein	28·4 gm.	8 gm. approx.
Calories	338	95 approx.

It is reconstituted by mixing one part of powder with 7 parts of water, then bringing to the boil and simmering for 20 minutes. The addition of 2 parts of chopped fresh vegetables effects an improvement.

With both the reconstituted roller dried and compounded soups the protein and calorie values will be one-eighth of those given on the dry basis.

11. Soya Beans

The beans themselves are not easy to use. They are very hard and require prolonged cooking to soften. They also impart a pronounced " beany " flavour to dishes unless used sparingly.

12. Soya Flours

Soya is normally available in three forms—the *full fat flour*, *low fat flour* and the so-called *grits*. The general conditions outlined above for the storage of flour apply to the storage of soya products. Stores should be clean, cool and dry. Soya flour is very liable to insect infestation, and stores should be carefully watched for signs of this occurring.

The *full fat flour* can be incorporated in flour, up to about 5 per cent., for bread making. Larger proportions, up to 10 per cent., can be used, but tend to impair the quality of the loaf.

The *grits* provide a useful protein supplement for use in sausages, meat pies, galantines, etc. Up to 10 per cent. can be used, but the most suitable proportion is 5-7 per cent. Soya flours are not so suitable for this purpose as the grits, because the former tend to spoil the texture of the products.

13. Vegetables (Dried)

Dried carrots, either in the form of dice or strips, and *dried cabbage*, as shreds, will be gas-packed in tins. The gas packing ensures longer retention of vitamin content and palatability than packing in air. Even when gas-packed, however, darkening in colour and loss of flavour and of vitamin content will occur after prolonged storage (e.g.

12 months in temperate climates), but the material will still remain wholesome and nutritious.

The following instructions for cooking should be used:

Method (*Carrot*). Cover the dried carrot with boiling water, keep hot (not quite boiling) for one or, preferably, two hours; then boil gently for 20-30 minutes.

1 lb. dried carrot will give about 7 lb. when cooked.

Method (*Cabbage*). Cover the dried cabbage with boiling water, bring to boil as soon as possible and boil gently until tender (20-40 minutes), adding more water if necessary.

More salt is required than with fresh vegetables.

1 lb. dried cabbage will give about 8 lb. when cooked.

Dried carrot and cabbage may also be available in the form of *compressed blocks*, gas-packed in tins. The general quality and storage properties of the blocks are similar to those of the uncompressed materials noted above. Methods of cooking, however, are slightly different, viz.:

Cooking of Dried Carrot Blocks. To each 1 lb. of blocks (a block weighs 5 oz. approximately) add 1 gallon of boiling water; keep hot (not quite boiling) for one, or preferably two hours. If necessary, add a little extra water and boil gently as above.

More salt is required than with fresh vegetables.

1 lb. dried carrot blocks will give about 7 lb. when cooked.

Cooking of Dried Cabbage Blocks. To each 1 lb. of blocks (approximately 5 blocks) add $1\frac{1}{2}$ gallons of boiling water, bring back to the boil as soon as possible and boil gently until tender (20-40 minutes). Add more water if necessary.

More salt is required than with fresh vegetables.

1 lb. dried cabbage blocks will give about 8 lb. when cooked.

Chapter 8

EQUIPMENT FOR EMERGENCY FEEDING

1. Introduction

One must expect commodities to be scarce in an emergency, so methods of treating them must be simple. Plain food must be expected at first. Boiling and stewing are the simplest methods of cooking and are the most adaptable for large-scale work. Frying can be done in small quantities, and its best use at first is in improving stews. Roasting and baking require ovens; improvised ovens take longer to build than boiling trenches; mobile ovens take more space than boiling equipment and again, in cooking, an oven requires more supervision.

A catering unit requires a considerable staff; the number required for the preparation of food for cooking increases almost in proportion to the number to be fed unless mechanical appliances are available. The number of cooks required for such work will not increase in the same proportion; in fact, large-scale catering is mainly a matter of organization, and only a basic knowledge of cooking is required. Most of the work is routine and, especially in using improvised equipment, heavy.

It is essential that any catering unit be planned so that some person organizes each division of activity—stores, preparation of food, cooking, service, equipment—and some one person co-ordinates all activity. Before any catering operation, the need must be surveyed and a plan made to meet it, taking into account:

(*a*) Stores available; this is an absolute limiting factor, though one can economize to a certain extent—i.e. stew rather than solid food, or limiting feeding to one meal a day.

(*b*) Equipment available: this is not a limiting factor to the same extent as stores, for a considerable amount of improvisation can be done; however, both time and labour available have to be taken into consideration. One starts with as much

standard equipment as is available and any rapid improvisation; and this will cope with:

(i) A maximum number of emergency meals (of the stew and sandwich type, or

(ii) A smaller number of complete meals (of the two-course type).

The number to be fed will determine which of these two alternatives to take. If emergency meals are served, each day onwards an increasing amount of improvised equipment (assuming further standard equipment is not available) can be brought into operation; this can either

(iii) increase the number of emergency meals, or, assuming that the total number to be fed has been met,

(iv) gradually allow the introduction of complete meals in the place of emergency meals.

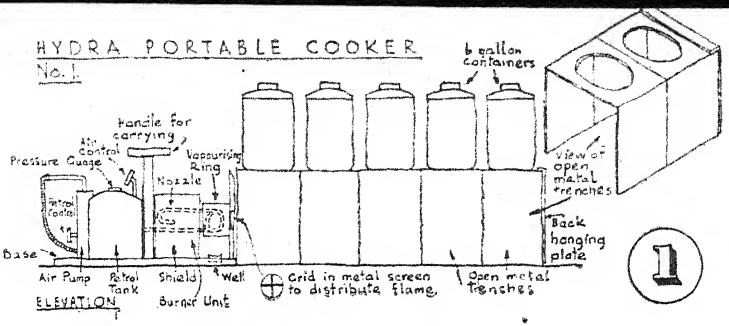
(*c*) Number to be fed: if the number exceeds (i) in the preceding paragraph, or the supplies of food available, priorities must be adopted until feeding can be stepped up to requirements; probably some kind of ticket or simple rationing system will be necessary. Priorities should be based either on nutritional needs or on general considerations such as the need for feeding essential workers.

(*d*) Labour available: production can be greatly increased by the use of local labour either in the preparation of food for cooking or in the service of food or in the construction of improvised equipment.

2. Mobile Catering

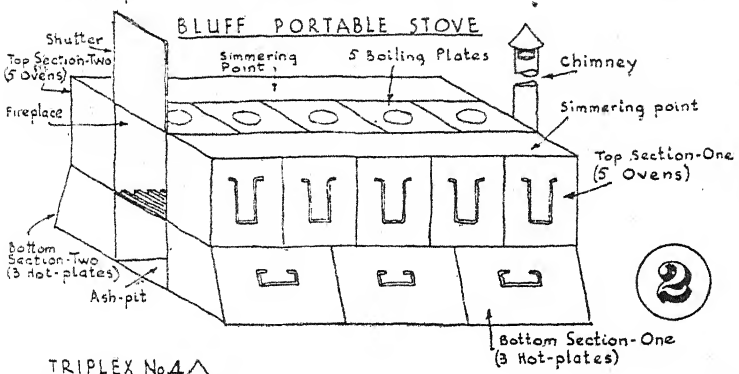
(*a*) *General.* Mobile feeding may be brought into operation because (i) a moving population, whether army or otherwise, requires feeding; (ii) the normal means of feeding has broken down temporarily; for a temporary period of about a week people can exist on emergency meals while the normal means of feeding can be brought into operation; (iii) there is insufficient means of normal feeding; here mobile feeding would be unsatisfactory both in regard to the type of meals provided

HYDRA PORTABLE COOKER No. 1



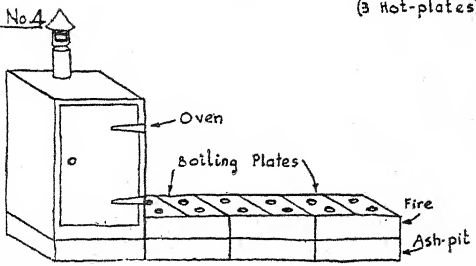
1

BLUFF PORTABLE STOVE



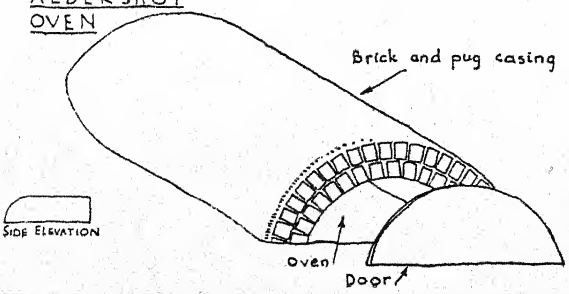
2

TRIPLEX No. 4 STOVE



3

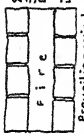
ALDER SHOT OVEN



4

Alternative ways of building fire trenches
The circular pattern can be used if the wind is variable.

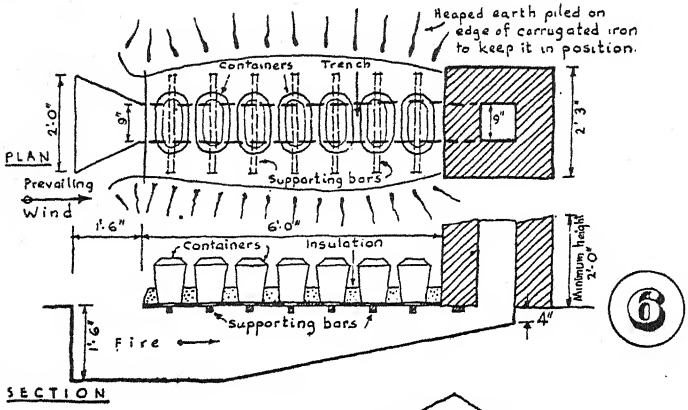
Principle of building walls leaving frequent gaps for adequate draught



PLAN

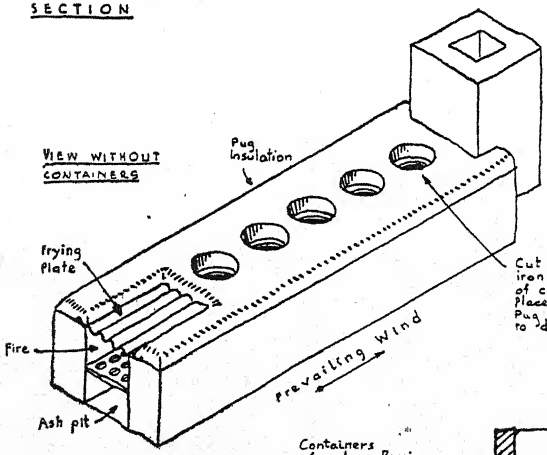
PLAN

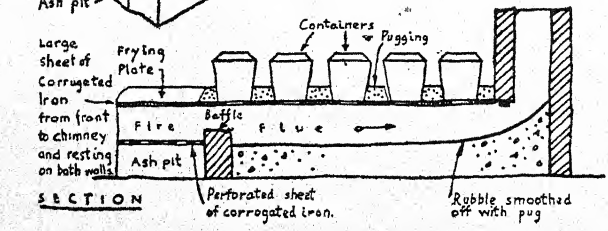
5



SECTION

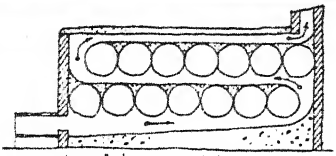
6





SECTION

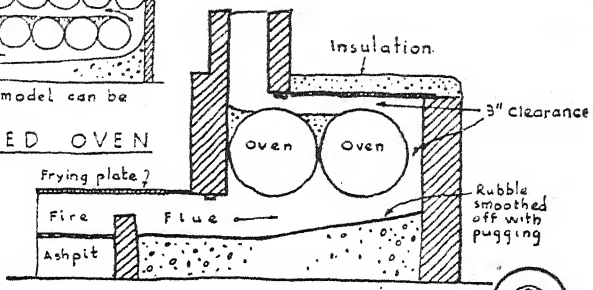
7



Example of how model can be extended.

IMPROVISED OVEN

Frame of petrol tins, bricks, etc.

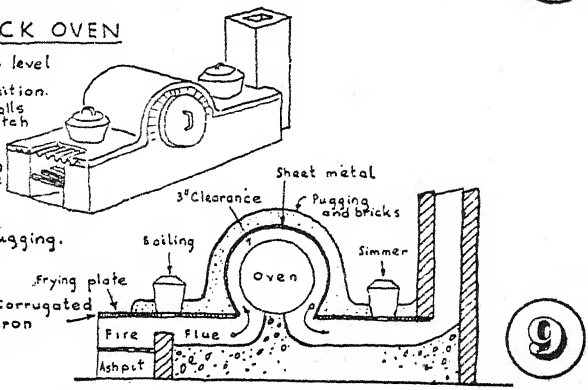


SECTION

8

CAMEL BACK OVEN

Build base up to level of oven bottom.
Place oven in position.
Continue side walls around as in sketch
Mould a piece of sheet metal around the oven leaving a 3" wide flue.
Cover with one course of bricks finished with pugging.

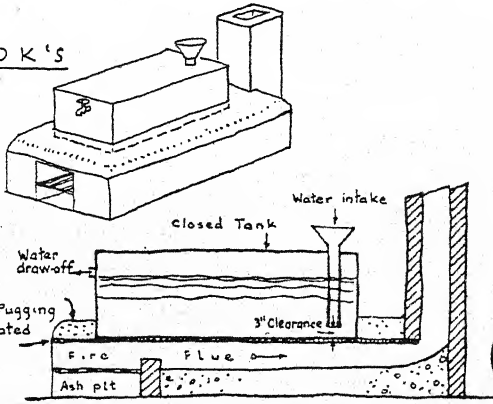


SECTION

9

LAZY COOK'S BOILER

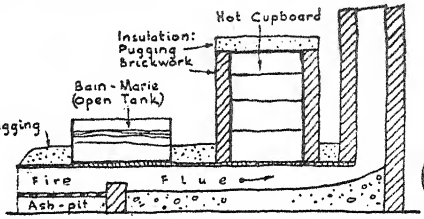
Intake is placed preferably at opposite end of tank to draw-off



SECTION

10

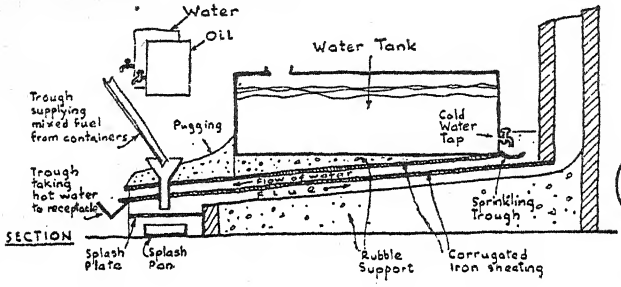
BAIN-MARIE & HOT CUPBOARD



SECTION

11

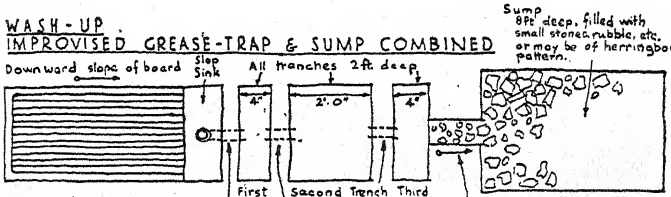
IMPROVISED GEYSER



SECTION

12

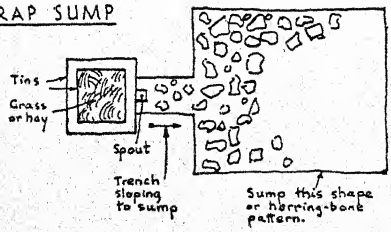
WASH-UP IMPROVISED GREASE-TRAP & SUMP COMBINED



PLAN

13

GREASE-TRAP SUMP



PLAN

14

R.C. D.J.

and in the tying up of mobile equipment, and static emergency feeding apparatus would best be used to fill the gap between mobile and normal feeding.

(*b*) *Army System.* In this war Hydra Portable Cooker No. 1 has mainly been used (illustration 1). This cooker operates on the Primus principle. The well is filled with petrol and ignited; when the cooker begins to blow the air is turned up to 50 lb. pressure and the petrol turned on full. The machine, operating like a blow-lamp, heats the trenches and thus the containers standing on them. The containers are boiled for a certain time (varying with the commodity contained in them) and are then placed in standard insulators so that cooking may continue (againt he minimum time in the insulator varies with the contents). Examples:

	Boiling Time.	*Minimum Time in Insulator.*
Stew	25 mins.	2½ hours
Potatoes, Porridge and Rice Pudding ..	5 mins.	1 hour
Root Vegetables ..	15 mins.	2 hours

The insulators are fitted with springs so that the container will fit snugly inside. The insulating material is glass wool.

This is an extension of the haybox method of cooking to emergency feeding; cooking time is reduced considerably and in consequence food can be produced rapidly in relays. The method is suitable for boiling, stewing and frying, but baking and roasting, which require top heat, are not possible.

If petrol cookers are used with care and have adequate maintenance, they can cope speedily and reliably with larger numbers than any other equipment can deal with for bulk. Their disadvantages are that they may explode unless due care is exercised in their use, and that their high petrol consumption makes them uneconomical in other than mobile feeding. Using the containers in relays and using four burners and a hundred insulators, about twenty-five thousand people could be provided with an emergency meal per 16-hour day. Hydra Portable Cooker No. 1 is also used mounted in a lorry.

3. Static Catering

Except in the case of a moving population, all mobile feeding must be followed by static feeding.

(*a*) *Army System.* The equipment available for this is as follows:

(i) Any standard equipment from canteens, restaurants, etc., which can be salvaged.

(ii) Standard portable equipment:

Bluff Portable Stove (illustration 2). This stove is divisible into four main parts as shown which comprises five boiling points, ten ovens and six hotplates. It can provide about 250 complete meals every two to three hours. A smaller stove of six ovens and four hotplates is also available.

Triplex No. 4 Stove (illustration 3). This comprises one large oven and six boiling plates. It can provide about a hundred complete meals every two to three hours. It is detachable and is built of a base of petrol tins, bricks, etc., and the front part of the base forming an ash pit.

Aldershot Oven (illustration 4). This comprises two arches with back plate, front door and bottom plate; these are erected and insulated with soil, pug cover, and brick facings to a depth of nine inches, thus making an oven five feet one inch in length and three feet six inches in breadth. The bottom plate can be replaced by a level floor of bricks. The oven needs drying off—this takes about 300 lb. of wood. The oven cooks by stored heat; about 150 lb. wood is burnt in the oven, the embers drawn out, the ash evenly raked over the floor; the food is then placed inside and the door sealed. The oven will bake for about 200 meals and will take about 1 hour to heat up again.

(*b*) *Improvised Equipment.* This should only be used to supplement existing equipment, or where no other or better

equipment is available. It is laborious to build, unreliable in use and extravagant in fuel. Nevertheless it is invaluable in an emergency.

One must first concentrate on boiling equipment and then supplement with ovens, using whatever material is available. The equipment should face the prevailing wind. Use petrol tins filled with earth for preference, or bricks, tins, turf or sandbags (which must be reinforced in tin where in contact with open fire). Pug is used for insulation and binding; it is preferably a mixture of clay, sand and water, but earth and water can be satisfactory; if straw or heather is mixed in it will help to prevent cracking. Ovens are best made from empty oil drums.

(i) The simplest method for boiling is to prepare an open trench allowing for adequate ventilation (illustration 5).

(ii) An enclosed trench (illustration 6) will take slightly longer to built but will be more economical in fuel and will have a better draught.

(iii) Illustrations 8 to 11 are based on the kettle trench (illustration 7). In all these constructions the fire should be equal in length to one-third of the flue and the chimney should equal the flue.

(iv) The improvised geyser (illustration 12) is a speedy device for the provision of hot water. Heat is supplied by the firing of water and oil drip to a sheet of corrugated iron. Water is supplied to this sheet through a sprinkling cloth, and by the time the water has reached the trough at the mouth, it should be piping hot.

(v) Aldershot oven can be improvised from a large oil-drum half buried and built on the plan explained above.

(vi) Hole in or above ground. This oven is similar to an Aldershot in that it cooks by stored heat.

A shallow, rectangular box is dug in or constructed above the ground, heated in the same way as an Aldershot, the food placed inside, and the trench covered with a metal sheet on which the hot embers are placed.

(vii) Greater use can be made of existing equipment by the use of hayboxes when food need only be brought to boiling point and then placed in the haybox where it will continue to cook. A haybox can be made either by using a dustbin or large box lined with hay, paper, rugs, or any other non-conductor of heat to a thickness of at least three inches, so that the container of food will be completely enclosed; or if such equipment is not available or the container is not to be transported, by digging a hole in the ground and insulating it in a similar way.

(viii) Washup, improvised grease-trap and sump combined (illustration 13). The trenches should be kept filled with water above the level of the connecting pipe so that grease cannot flow through.

(ix) Grease-trap sump (illustration 14). Two tins, one inside the other and held up by stones. The inside tin contains hay or grass to trap grease and is perforated to allow water to escape. The outer tin has a spout at the bottom leading to the trench.

Appendix 1

EUROPEAN CURRENCY

Sterling values at 1939 official par rates

Belgium

1 *Belga* = 5 francs; 1 franc = 100 centimes (£1 = 35 Belga).

Coinage	Silver	50, 20 franc pieces.
	Nickel	5, 1 franc and 50 centimes pieces.
	Cupro Nickel	25, 10, 5 centimes pieces.
Notes	10,000, 1,000, 500, 100, 50, 25, 5 franc notes. 2,000, 200, 100, 20, 10, 4, 1 Belga notes.	

Bulgaria

1 *Lev* = 100 stotinki (£1 = 673,659 Leva).

Coinage	Gold	100, 20, 10 Leva pieces (not now circulated).
	Silver	100, 50 Leva pieces.
	Copper	10, 5, 2, 1 Leva and 50 stotinki pieces.
Notes	5,000, 1,000, 500 Leva denominations.	

Czechoslovakia

1 *Koruna* = 100 haleru (£1 = 164·25 Kč.).

After 1939, 10 Kč. fixed at 1 Reichsmark; circulation of Koruna ceased 1940.

Denmark

1 *Koruna* = 100 ore (£1 = 18·159 Kr.).

Coinage	Gold	20, 10 Kroner pieces (not now circulated).
	Aluminium Bronze	2, 1, ½ Kroner pieces.
	Nickel	25, 10 ore pieces.
	Bronze	5, 2, 1 ore pieces.
Notes	500, 100, 50, 10, 5 Kroner denominations.	

Estonia

1 *Kroon* = 100 sents (£1 = 18·16 Kr.).

Coinage	Silver	2 Kroon pieces.
	Bronze	1 Kroon pieces.
	Nickel	50, 20, 10 sents pieces.
	Copper	5, 2, 1 sents pieces.
Notes	100, 50, 20, 10, 5 Kr. denominations.	

Finland

1 *Markka* = 100 penni (£1 = 193·23 Markka).

Coinage	Gold and silver coins not now minted.	
	Bronze	20, 10, 5 markka pieces.
	Nickel	1, ½, ¼ markka pieces.
	Copper	10, 5, 1 penni pieces.
Notes	1,000, 500, 100, 50, 20 Markka denominations.	

France

1 *Franc* = 100 centimes (£1 = 124·21 francs).

Coinage	Silver	20, 10 franc pieces.
	Nickel	5 franc pieces.
	Aluminium Bronze	2, 1 franc and 50 centime pieces.
	Bronze Nickel	25, 10, 5 centime pieces.
	Alloy	25, 10, 5 centime pieces.
Notes	5,000, 1,000, 500, 50 franc denominations.	

Germany

1 *Reichsmark* = 100 Reichspfennig (£1 = 20·43 Rm.).

Coinage	Silver	5, 2 Rm. pieces.
	Nickel	1 Rm., 50 pfennig pieces.
	Aluminium Bronze	10, 5, 2, 1 Rpfennig pieces.
Notes	1,000, 100, 50, 20, 10 Rm. denominations.	

Greece

1 *Drachma* = 100 lepta (£1 = 375 Dr.).

Coinage	Silver	20, 10 Dr. pieces.
	Nickel	5 Dr. pieces.
	Copper	2, 1 Dr., 50, 20 lepta pieces.
	Aluminium	10 lepta pieces.
Notes	5,000, 1,000, 500, 100, 50 Dr. denominations.	

Holland

1 *Florin* or *Guilder* = 100 cents (£1 = 12·107 G.).

Coinage	Gold	10, 5 Florin pieces.
	Silver	2½, 1, ½ Florin, 25, 10 cents pieces.
	Nickel	5 cent pieces.
	Bronze	2½, 1, ½ cent pieces.
Notes	1,000, 500, 100, 50, 25, 20, 10 Florin denominations.	

Hungary

1 *Pengo* = 100 filler or garas (£1 = 27·82 P.).

Coinage	Silver	5, 2, 1 Pengo pieces.
	Nickel	50, 20, 10 filler pieces.
	Copper	2, 1 filler pieces.
Notes	1,000, 100, 50, 20, 10 Pengo denominations.	

Italy

1 *Lira* = 100 centesimi (£1 = 92·46 L.).

Coinage	Gold	500, 100 Lire (not in circulation).
	Silver	20, 10, 5 Lire pieces.
	Nickel	2, 1 Lire, 50, 20 centesimi pieces.
	Bronze	10, 5 centesimi pieces.
Notes (in general use)		1,000 500 100 50, 10 Lire.

Latvia

1 *Lats* = 100 santimi (£1 = 25·225 Lati).

Coinage	Silver	5, 2, 1 Lati pieces.
	Nickel	50, 20, 10 santimi pieces.
	Bronze	5, 2, 1 santimi pieces.
Notes		500, 100, 50, 25, 20, 10 Lati denominations.

Lithuania

1 *Lita* = 100 centas (£1 = 48·66 L.).

Coinage	Silver	10, 5, 2, 1 Litu pieces.
	Copper	50, 20, 10, 5, 1 centas pieces.
	Bronze	5, 2, 1 centas pieces.
Notes		1,000, 500, 100, 50, 20, 10, 5 Litas.

Luxembourg. As Belgium.

Norway

1 *Krone* = 100 ore (£1 = 18·15 Kr.).

Coinage	Gold	20, 10, 5 Kr. pieces.
	Nickel	1 Kr., 50, 20, 10 ore pieces.
	Copper	5, 2, 1 ore pieces.
Notes		1,000, 500, 100, 50, 10, 5 Kr.

Poland

1 *Zloty* = 100 grosz (£1 = 43·38 Zl.).

Coinage	Silver	10, 5, 2 Zl. pieces.
	Nickel	1 Zl., 50, 20, 10 grosz pieces.
	Copper	5, 2, 1 grosz pieces.
Notes		500, 100, 50, 20 Zloty.

Portugal

1. *Escudo* = 100 centavos.

Coinage	Silver	10, 5, 2½ Escudo pieces.
	Copper	1 Es., 50, 20 centavos pieces.
	Bronze	10, 5 centavos pieces.
Notes		1,000, 500, 100, 50, 20 Escudo.

Roumania

1 *Leu* (Lei) = 100 bani (£1 = 813·5 L.).

Coinage	Silver	5, 2, 1 Lei, 50 bani pieces.
	Nickel	20, 10, 5 bani pieces.
Notes	1,000, 500 Lei.	

Russia

1 *Chervonetz* = 10 gold roubles = 1,000 Kopecks (£1 = ·946 C.).

Coinage	Silver	1 rouble, 50, 20, 15, 10 kopeck pieces.
	Copper	5, 3, 2 Kopeck pieces.
Notes	5, 3, 1 roubles, 50, 25, 10, 3, 2, 1 Chervonetz.	

Spain

1 *Peseta* = 100 centimos (£1 = 25·221 P.).

Coinage	Silver	5, 2, 1 Peseta, 50 centimos pieces.
	Nickel	25 centimos pieces.
	Bronze	10, 5 centimos pieces.
Notes	1,000, 500, 100, 50, 25, 5, 2, 1 Peseta.	

Switzerland

1 *Franc* = 100 centimes.

Coinage	Gold	100, 20, 10 Franc pieces.
	Silver	5, 2, 1 Franc, 50 centimes pieces.
	Nickel	20, 10, 5 centimes pieces.
	Bronze	2, 1 centimes pieces.
Notes	1,000, 500, 100, 50, 20, 5 Francs.	

Sweden

1 *Krona* = 100 ore (£1 = 18·159 Kr.).

Coinage	Gold	20, 10, 5 Kr. pieces.
	Silver	5, 2, 1 Kr., 50, 25, 10 ore pieces.
	Nickel	50, 25, 10 ore pieces.
	Bronze	5, 2, 1 ore pieces.
	Iron	5, 2, 1 ore pieces.
Notes	1,000, 100, 50, 10, 5 Kr.	

Yugoslavia

1 *Dinar* = 100 paras (£1 = 276·316 D.).

Coinage	Silver	50, 20, 10 Dinar pieces.
	Bronze	2, 1 Dinar, 50, 25 paras pieces.
Notes	1,000, 500, 100 Dinar.	

Appendix 2

WEIGHTS AND MEASURES

Conversion Factors for Metric and Imperial System

MASS

1 kilogram	=	2·2 lb.
	=	35·27 oz.
1 pound	=	453·6 grammes
1 ounce	=	28·35 grammes
1 grain	=	0·0648 gramme

CAPACITY

1 litre	=	1·76 pints
	=	35·2 fluid ounces
1 millilitre (fluid gramme)	=	16·9 minims
1 pint	=	568·25 fluid grammes
	=	0·5682 litre
1 fluid ounce	=	28·4 fluid grammes
1 fluid drachm	=	3·55 fluid grammes
1 minim	=	0·059 fluid grammes

LENGTH

1 metre	=	39·37 inches
1 inch	=	25·4 millimetres

In some countries somewhat unusual units may be found; the following are noteworthy:

The **Dutch** pound weight is ½ kgm., and is used in grocery sales.

In **Germany** pfund = ½ kgm. (widely used before Nazi prohibition).

Zentner (Ztr.) = 50 kgm.
Doppelzentner = 100 kgm.
12 pieces is often known as a " Dutzend "
15 pieces is often known as a " Mandel "
60 pieces is often known as a " Schock "
In Bavaria, one litre is a " Mass "
half litre is a " Seidel " } of beer usually
In Swabia, half litre is a " Schoppen "
In Thuringia, half litre is a " Kaertchen "

In **Poland,** 100 kgm. = 1 cetna
1,000 kgm. = 1 tonna

In **France,** bread is sold by weight.
one livre is ½ kgm.

All relief workers are advised to carry some article, such as a watch, of which they know the precise weight in grammes and ounces.

APPENDIX 3

SUGGESTED FORMS FOR REPORTS ON SURVEYS

FOR the initial survey of needs, enquiry should be made of a random sample of about 500 households in order to obtain reasonable statistical accuracy. Ten people should be able to do this in less than a week (see "Personnel", p. 51). The normal unit of investigation should be the family, but it may be found that in some cases more than one family live under the same roof; in these cases the interview should cover everyone in the house. The questions should be addressed to the one person in the family responsible for procuring supplies. It seems necessary to find out not only about the supplies available and procured but also whether people think they are getting sufficient; neither the food available nor people's subjective impressions of it will necessarily show what from the nutritional point of view would be adequate, but both give information which can be used to check data from official sources.

It should be possible to have forms printed, in the national language, for the use of indigenous helpers, with the necessary questions tabulated. A form should be small (say not larger than 8 in. by 5 in.) and made of stiff card suitable for writing on and for subsequent filing. Each interview should be given an index number for filing purposes and so that the name and address of the person interviewed should not be shown on the card.

The headings and layout of suggested forms for general interviews are shown on page 105, and for anthropometric measurements and clinical observations on page 107.

Index No. of Interview ..... Town .....
Place of Interview ..... Social Grade .....
Investigator ..... Date .....

I. Household members.	Sex.	Age.	Relation. Lodger or Relation.	Occupation.	Meals away from home, number, place, free or paid.	Without			
						Overcoats.	Suits or Dresses.	Under-clothes.	Shoes.

2. Are food supplies distributed fairly ?..... If not, in what way unfairly ?.....
.....
3. What do you think could be done to improve the food situation ?.....
.....
4. See over.
5. Cooking facilities:
coal or wood; gas ; electricity ; oil ;
Cooking fuel supplies: sufficient; fair ; none ;
Cooking utensils required:
6. Repairs needed to house : none; minor; major;
7. Gross family income:
Rent:

	Did you obtain your full ration last week ?	Amount obtained last week.	Amount obtained last week from			Prices from		Regular distribution over last 6 months.		If irregular how long since last distribution ?	Remarks.
			open market.	administration.	private sources.	open market.	private sources.	Yes ?	How frequent ?		
Dried Milk, Liquid Milk, Condensed Milk (Note whether full cream or skimmed.)											
Cheese											
Meat											
Sausages											
Offals											
White Fish											
Fat Fish											
Eggs											
Butter											
Margarine											
Edible Oils											
Sugar											
Jam and Marmalade											
Syrup and Honey											
Potatoes											
Root Vegetables											
Green Vegetables											
Pulses											
Nuts											
Fresh Fruit											
Dried Fruit											
Bread											
Flour											
Oatmeal											
Barley											
Maize											
Rice and other cereals											
Tea											
Coffee											
Cocoa											
Beers											
Wines											
Spirits											
All other goods											

MEASUREMENTS AND CLINICAL OBSERVATIONS

Name:..... Index Number: .....
Town: ..... Social Grade:.....
Place of Examination: ..... Date: .....
Investigator: .....

Measurements

Record heights to the nearest centimetre and weights to the nearest 0·1 kg. Weigh in vest, knickers and socks and as near as possible at the same time of day each time. Record age to nearest month.

Time of Weighing: ....; ....; ....; ....; ....; ....; ....; ....
Age: ....; ....; ....; ....; ....; ....; ....; ....
Weight: ....; ....; ....; ....; ....; ....; ....; ....
Standing Height ....; ....; ....; ....; ....; ....; ....; ....

General Information

Able to attend work or school ?.....
If not, why not ? .....
Any known disease at present ? .....
What illnesses lasting more than 1 week (in bed) during the past year ?
.....
.....
.....

Clinical Observations

(*Put a tick in the right-hand column if the condition is present*)

Skin

Dryness and roughness of the skin (" nutmeg grater feeling ") on upper arms or thighs .....
Rough red cracked skin on face or neck .....
Dark scaly rash on back of both hands .....
Blood specks under the skin of the shins that do not fade on pressing .....
Bruises without history of injury .....

Eyes

Rapidly failing vision .....
Complete inability to see in dim light .....
Dryness, thickening and wrinkling of the surface of the eyeballs .....
Small painless ulcers on the eyeballs .....

Mouth

Pallor of both lips and tongue .....
All teeth missing .....
Dentures present .....
Cracks at the corners of the mouth .....
Sore tongue .....
Bright scarlet tongue .....
Purple, swollen and bleeding gums .....

Skeleton

(in children up to 18 years)

Fontanelle open after 18 months .....
Misshapen chest .....
Abnormally bowed or bent legs.....

General Condition

Apparently well nourished .....
Moderate wasting .....
Gross emaciation .....
Protruding abdomen (under 14 years) .....
Oedema: swelling of both legs, pitting on pressure with fingers .....
Rapid exhaustion on slight exertion .....
Calf muscles tender on pressure .....
Gnawing pains or tenderness of bones or muscles .....
Paralysis with wasting of both lower limbs .....
Chronic diarrhoea.....
Mental outlook: normal .....
apathetic .....

GENERAL REMARKS

Appendix 4

GLOSSARY

This is a short list of some foodstuffs and cooking terms. The French and German words are not always exact equivalents of the English. The fourth column has been left blank for the individual relief worker to fill in when necessary.

Cereals, Pulses, Conserves		
barley	l'orge (f.)	die Gerste
corn	le blé	das Korn
cornflour	la farine de maïs	das Maismehl (Puddingpulver)
flour	la farine	das Mehl
haricot beans	les haricots verts (soissons)	welsche Bohnen
jam	la confiture	die Marmelade
lentil	la lentille	die Linse
maize	le maïs	der Mais
oats	l'avoine (f.)	der Hafer
rice	le riz	der Reis
rye	le seigle	der Roggen
semolina	la semoule	der Gries
wheat	le froment	der Weizen
Meat	la viande	das Fleisch
bacon	le lard	der Speck
beef	le boeuf	das Rindfleisch
ham	le jambon	der Schinken
mutton	le mouton	das Hammelfleisch
pork	le porc	das Schweinefleisch
rabbit	le lapin	*das Kaninchen
sausage	la saucisse / le saucisson	†die Wurst
veal	le veau	das Kalbfleisch
Fish	le poisson	der Fisch
herring	le hareng	der Hering
trout	la truite	die Forelle
Vegetables	les légumes	das Gemüse
broad bean	la fève	die Saubohne
french bean	le haricot vert	die Schnittbohne
beetroot	la betterave	die rote Rübe
cabbage	le chou	der Kohl
carrot	la carotte	die Karotte

* In Germany, rabbits are rare; hares (Hasen) are eaten instead.

† N.B.—frying sausage, die Bratwurst; smoked sausage for keeping, die Hartwurst, or die Dauerwurst; soft sausage for spreading on bread, die Weichwurst, or die Streichwurst.

cauliflower	le choufleur	der Blumenkohl
cucumber	le concombre	die Gurke
leek	le poireau	der Lauch
marrow	la courge	der Kürbis
onion	l'oignon (m.)	die Zwiebel
pea	le petit pois	die Erbse
potato	la pomme de terre	die Kartoffel
spinach	l'épinard	der Spinat
tomato	la tomate	die Tomate
turnip	le navet	die weisse Rübe

Fruits	les fruits	das Obst
apple	la pomme	der Apfel
date	la datte	die Dattel
fig	la figue	die Feige
grape	le raisin	die Weintraube
melon	le melon	die Melone
pear	la poire	die Birne
plum	la prune	die Pflaume
prune	le pruneau	die Backpflaume
raisin	le raisin sec	die Rosine

Dairy Products, Fats, etc.

cream cheese	le petit suisse le fromage blanc	der Sahnenkäse der Rahmkäse (S. Ger.)
curds	le lait caillé	der Quark
lard	la graisse de porc	das Schweineschmalz
margarine	la margarine	die Margarine (die Kunstbutter) das Pflanzenfett
milk, skimmed	le lait écrémé	die abgerahmte Milch
milk powder	le lait en poudre	das Milchpulver
oil	l'huile (f.)	das Speiseöl
whey	le petit lait	die Molken

Cooking Equipment, Fuels, etc.

boiler	la bouilloire	der Kochofen
coal	le charbon	die Kohle
paraffin	le pétrole	das Paraffinöl
oven	le four	der Backofen
wood	le bois	das Holz

Cooking Utensils

bowl	le bol	die Schüssel
colander	la passoire	der Seiher
dish	le plat	der Servierteller
fork	la fourchette	die Gabel
frying pan	la poèle	die Bratpfanne
grater	la râpe	das Reibsieb
knife	le couteau	das Messer
ladle	la cuiller à soupe	der Schöpflöffel
plate	l'assiette (f.)	der Teller
saucepan	la marmite	der Kochtopf
sieve	le tamis	das Sieb
spoon	la cuiller	der Löffel

Cooking Terms

to boil	bouillir	kochen, sieden
to braise	braiser	schmoren
to carve	trancher	servieren, tranchieren
to cut	couper	schneiden
to milk	traire	melken
to peel	pêler	schälen
to pick	cueillir	pflücken
to poach	pocher	sieden
to pluck	plumer	rupfen
to roast	rôtir	braten
to sieve	passer	sieben
to simmer	mijoter	sieden
to skim	écumer	abschäumen
to skin	écorcher	enthäuten

baking powder	la poudre de levure	der Backpulver
dumpling	la quenelle	der Kloss der Knödel (S. Ger.)
a hunk of bread	une tartine	ein Butterbrot
insipid	fade	fade
noodles	les nouilles	Nudeln
pancake	la crèpe	der Pfannkuchen
paste (dough)	la pâte	der Teig
raw	cru	roh
slice	la tranche	die Schnitte
stock	le bouillon	die Fleischbruhe
yeast	le levain	die Hefe